MODERN MECHANIX

HOBBIES AND INVENTIONS

JANUARY
NSC

A FAWCETT PUBLICATION

15¢

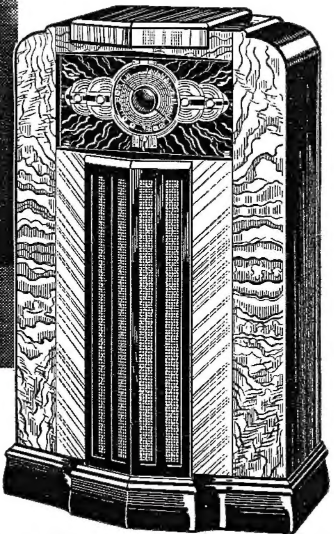
Drawn by
Walt Disney Studios

Mickey Mouse Sound Tricks Revealed

GREAT INVENTIONS OF FAMOUS MEN

SAVE UP TO 50% DIRECT FROM MIDWEST FACTORY!

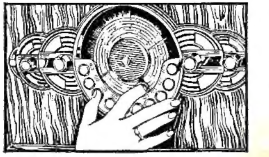
"I REMEMBER WHEN RADIO FIRST STARTED...
EVEN THEN MIDWEST WAS KNOWN FOR ITS
Power AND *Beauty!*"



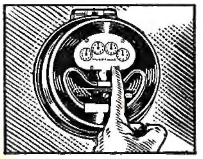
MAIL COUPON *Now* FOR NEW *FREE* 40-PAGE CATALOG

Mail coupon today for new, FREE 40-page catalog...and learn how you can save up to 50% by buying direct from Midwest factory. See for yourself that Midwest offers today's greatest radio values, and scores of exciting features, like Dial-A-Matic Tuning, plus Electrik-Saver. With the sensational Dial-A-Matic Tuning feature, for example, even a child can bring in ten perfectly tuned programs in ten seconds. Zip! . . . Zip! . . . Zip! . . . stations come in instantly, automatically, perfectly . . . as fast as you can push buttons. The exclusive Midwest Electrik-Saver cuts radio wattage consumption 50%, enables Midwest radios to use no more current than ordinary 7-tube sets.

ONLY IN MIDWEST DO YOU GET DIAL-A-MATIC TUNING *plus* ELECTRIK-SAVER



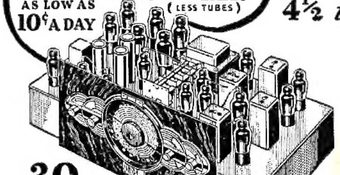
DIAL-A-MATIC TUNING
Now, even a child can bring in ten perfectly tuned programs in ten seconds! It's a big thrill to whirl the dial . . . and then hear the station you want . . . come in instantly, automatically . . . as fast as you can press buttons!



ELECTRIK-SAVER
This exclusive Midwest feature cuts radio wattage consumption 50% . . . results in Midwest radios using no more current than ordinary 7-tube set . . . enables you to operate on voltages as low as 80 volts.

Only $59.50 COMPLETE with GIANT THEATRE-SONIC SPEAKER (LESS TUBES)

TERMS AS LOW AS 10¢ A DAY



30 DAYS *FREE* TRIAL

You have a year to pay...terms as low as 10c a day...you secure privilege of 30 days' FREE trial in your own home. In addition, you are triply protected with Foreign Reception Guarantee, One-Year Warranty and Money-Back Guarantee.

18 TUBES

SIX WAVE BANDS

4½ *to* 2400 METERS

Bigger, better, more powerful, more beautiful, this super deluxe Midwest out-performs $150 sets on a point-for-point comparison. Amazingly selective, delicately sensitive, it brings in distant foreign stations with full loud speaker volume on channels adjacent to powerful locals. You'll thrill over its marvelous super-performance...glorious crystal-clear "concert realism" . . . magnificent world-wide foreign reception. Powerful Triple-Twin tubes (two tubes in one) give 22-tube results. You can switch instantly from American programs . . . to Canadian, police, amateur, commercial, airplane, ship broadcasts . . . to the finest and most fascinating foreign programs. Never before so much radio for so little money. Why pay more? Save up to 50% by buying at wholesale . . direct from factory...preferred by thousands of careful radio purchasers since 1920.

MAIL COUPON TODAY FOR *FREE* 30-DAY TRIAL OFFER *AND* 40-PAGE FOUR-COLOR *FREE* CATALOG

MIDWEST
1937

MIDWEST RADIO CORPORATION
Dept. G-10
Cincinnati, Ohio
Without obligation on my part, send me your new FREE catalog and complete details of your liberal 30-day FREE trial offer. This is NOT an order.

Name..

Address..

Town...State..............................

(Special offer and prices prevail only when dealing direct with factory by mail.)

MIDWEST RADIO CORP.
DEPT. G-10 CINCINNATI, OHIO, U.S.A.
Established 1920 Cable Address MIRACO...All Codes

What will you be doing—ONE YEAR FROM TODAY?

THREE hundred and sixty-five days from now—what?

Will you still be struggling along in the same old job at the same old salary—worried about the future—never able to make both ends meet?

One year from today will you still be putting off your start toward success—thrilled with ambition one moment and then cold the next—delaying, waiting, fiddling away the precious hours that will never come again?

Don't do it, man—don't do it.

There is no greater tragedy in the world than that of a man who stays in the rut all his life, when with just a little effort he could advance.

Make up your mind today that you're going to train yourself to do some one thing well. Choose the work you like best in the list below, mark an X beside it, and, without cost or obligation, at least get the full story of what the I. C. S. can do for you.

INTERNATIONAL CORRESPONDENCE SCHOOLS

BOX 2320-K, SCRANTON, PENNA.

★ Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject *before* which I have marked X: ★

TECHNICAL AND INDUSTRIAL COURSES

☐ Architect
☐ Architectural Draftsman
☐ Building Estimating
☐ Contractor and Builder
☐ Structural Draftsman
☐ Structural Engineer
☐ Management of Inventions
☐ Electrical Engineer
☐ Electric Lighting
☐ Welding, Electric and Gas
☐ Reading Shop Blueprints
☐ Heat Treatment of Metals
☐ Sheet Metal Worker
☐ Boilermaker
☐ Telegraph Engineer
☐ Telephone Work ☐ Radio
☐ Mechanical Engineering
☐ Mechanical Draftsman
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☐ Diesel Engines
☐ Aviation Engines
☐ Automobile Mechanic
☐ Refrigeration
☐ Plumbing ☐ Steam Fitting
☐ Heating ☐ Ventilation
☐ Air Conditioning
☐ Steam Engineer
☐ Steam Electric Engineer
☐ Marine Engineer
☐ R. R. Locomotives
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☐ Air Brakes ☐ R. R. Signalmen
☐ Highway Engineering
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BUSINESS TRAINING COURSES

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☐ Advertising
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☐ Civil Service ☐ Mail Carrier
☐ Railway Mail Clerk
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☐ Cartooning
☐ Lettering Show Cards ☐ Signs

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☐ Professional Dressmaking and Designing
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☐ Millinery
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☐ Foods and Cookery

Name............................*Age*..............*Address*............................

City............................*State*..............*Present Position*............................

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MODERN MECHANIX

HOBBIES & INVENTIONS

JANUARY
1937

Volume XVII
Number 3

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NEXT MONTH

Dr. Miller McClintock, noted Harvard University authority on traffic regulation, tells MM readers how effective traffic control can be accomplished through engineering. His timely article expounds ways and means by which crowded cities can convert their present inadequate highways into thoroughfares featuring maximum safety for motorists and pedestrians alike. Don't fail to read this authentic solution to a modern problem.

FOR WORKSHOP FANS

Among the highly interesting projects scheduled for the February issue there will be plans for building an Aero-Drive Ice Sled, an All-Purpose Desk, 2-Tube Metal-Glass All-Wave Radio, Electric Reactance Coil Experiments, and many other workshop plans, suggestions, and time saving kinks.

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1938 1939 1940 1941 1942 1943 1944 1945 1946 1947
1947
6

The leaders of the next ten years will largely be determined in the next ten months. Will you be one of them?

Will You Be Clerk or Manager
Ten Years from Now?

"SURELY, this could never happen to *me*," you say—"that I should be sitting at the same desk—be doing the same work—*for ten straight years!*"

But wait a minute—

Exactly that same thing has happened to thousands upon thousands of men. It has probably happened to men right in the company you now are working for. *And —unless you fit yourself for a better job—there is a very good chance that it may happen to you!*

Unthinkable? That's what J. N. Dixon of Columbus, Ohio, said to himself. Yet lack of training kept him slaving away at low wages for a long time.

TRIPLES INCOME

Here is Mr. Dixon's own story—"Just after I returned from the war, one of your representatives found me plugging away at a bookkeeper's job in Marietta, Ohio. He performed a real service and explained to me the need of further training, and induced me to take the LaSalle training in Higher Accountancy. After a few months of study, I secured a position with the Trust Department of a National Bank. This was the stepping stone I needed to various responsible positions including handling of receiverships and other important duties. That quickly boosted my income several hundred percent."

ANOTHER AMAZING SUCCESS STORY

If you think Mr. Dixon's success story unusual, please read what J. H. Krouse of Memphis, Tennessee, says. "When I decided to take your training in Higher Accountancy, I was a clerk. Today I am Chief Consultant Accountant for the U. S. Engineer's Office in Memphis, Tenn. Whatever success or recognition I have had, I owe to your training. I have had no other specialized training along this line. Your method of teaching is not only instructive but highly engaging. I have observed other courses, but firmly believe LaSalle has the best to be had anywhere."

Another bit of proof is Mr. R. P. Barthalow's experience. Mr. Barthalow is Chief of the Sales Tax Section of the Tax Commission of Ohio. A department which handles over $50,000,000 a year. Mr. Barthalow attributes much of his success to LaSalle training.

SEND FOR These Two Books and Start Toward Bigger Success

Need you hear more before you investigate the opportunities in Accountancy?

Or will you face the problem of your future NOW—and send to LaSalle and get further facts and particulars?

Without cost or obligation, the coupon will bring you two interesting books—one a 64-page book entitled, "Accountancy, the Profession that Pays"; the other "Ten Years' Promotion in One."

How about those next ten years—will you wait or will you START TODAY to realize the tremendous opportunities that lie ahead of you through sound and practical home-study business training?

Measure your grit and ambition by what you do with this coupon—NOW.

LaSalle Extension University

LASALLE EXTENSION UNIVERSITY, Dept. 1493-HR CHICAGO

Opportunities in Accountancy—Check below and we will send you a copy of "Accountancy, the Profession that Pays," also copy of "Ten Years' Promotion in One," all without obligation.

☐ Higher Accountancy: Leading to position as Auditor, Comptroller, Certified Public Accountant, Cost Accountant, etc.

Other LaSalle Opportunities: If more interested in one of the other fields of business indicated below, check that.

☐Business Management
☐Expert Bookkeeping
☐C. P. A. Coaching
☐Modern Salesmanship
☐Traffic Management
☐Law: Degree of LL. B.
☐Industrial Management
☐Personnel Management
☐Modern Business Correspondence
☐Stenotypy
☐Business English
☐Commercial Law
☐Effective Speaking

Name ....

Present Position.................................*Address*...............................

Ten years' promotion in one
Accountancy

BE A RADIO

J. E. SMITH, Pres., Natl. Radio Institute
The man who has directed the home study training of more men for the Radio Industry than any other man in America.

MANY MAKE $30 $50 $75 A WEEK

I Will Train You at Home— mail coupon for FREE Book

Do you want to make more money? Radio offers you many opportunities for well-paying spare time and full time jobs. And you don't have to give up your present job or leave home and spend a lot of money to become a Radio Expert.

Many Radio Experts Make $30, $50, $75 a Week

Radio broadcasting stations employ engineers, operators, station managers and pay up to $5,000 a year. Spare time Radio set servicing pays as much as $200 to $500 a year—full time jobs with Radio jobbers, manufacturers and dealers as much as $30, $50, $75 a week. Many Radio Experts operate their own full time or part time Radio sales and service businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, paying up to $6,000 a year. Radio operators on ships get good pay and see the world besides. Automobile, police, aviation, commercial Radio, and loud speaker systems are newer fields offering good opportunities now and for the future. Television promises to open many good jobs soon. Men I have trained are holding good jobs in these branches of Radio. Read their statements. Mail the coupon.

There's a Real Future in Radio for Well-Trained Men

Radio already gives jobs to more than 300,000 people. In 1935 over $300,000,000 worth of sets, tubes and parts were sold—an increase of 20% over 1934! Over 1,100,000 auto Radios were sold in 1935, 25% more than in 1934! 22,000,000 homes are today equipped with Radios, and every year millions of these sets go out of date and are replaced with newer models. Millions more need servicing, new tubes, repairs, etc. Broadcasting stations pay their employees (exclusive of artists) more than $23,000,000 a year! And Radio is a new industry, still growing fast! A few hundred $30, $50, $75-a-week jobs have grown to thousands in less than 20 years!

Many Make $5, $10, $15 a Week Extra in Spare Time While Learning

Practically every neighborhood needs a good spare time serviceman. The day you enroll I start sending you Extra Money Job Sheets. They show you how to do Radio repair jobs that you can cash in on quickly! Throughout your training I send you plans that made good spare time money —$200 to $500 a year—for hundreds of fellows. My training is famous as "the Course that pays for itself."

HERE'S PROOF THAT MY TRAINING PAYS

Chief Operator Broadcasting Station

"When I completed 20 lessons, I obtained my Radio Broadcast Operator's license and immediately joined Station WMPC, where I am now Chief Operator."—HOLLIS F. HAYES, 85 Madison St., Lapeer, Mich.

$10 Week in Spare Time

"My work has consisted of Radio set servicing, with some Public Address Systems work—all in my spare time. My earnings in Radio amount to about $10 a week."—WILLIAM MEYER, 705 Ridge Road, Hobart, Ind.

Service Manager For Four Stores

"I was working in a garage when I enrolled with N. R. I. In a few months I made enough to pay for the course three or four times. I am now Radio service manager for the M—— Furniture Co., for their four stores."—JAMES E. RYAN, 1535 Slade St., Fall River, Mass.

Own Business Pays $300 a Month

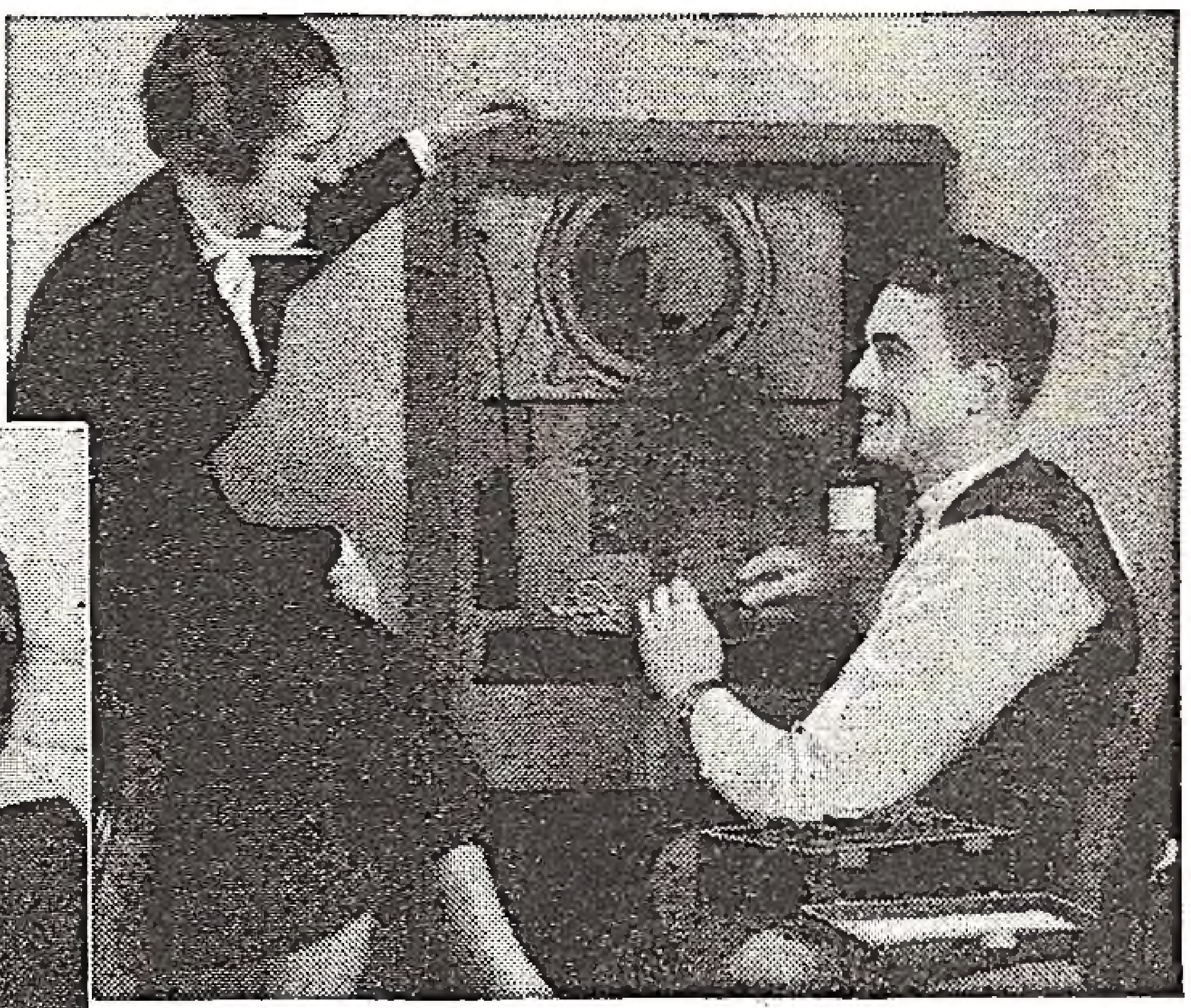
"I now have my own Radio business which shows three hundred dollars a month profit—thanks again to National Radio."—FRANK T. REESE, 39 N. Felton St., Philadelphia, Penna.

Earned $50 First Month in Spare Time

"I knew nothing about Radio. After four lessons I began servicing Radios, earning $50 the first month. Last winter I made as high as $100 a month in spare time."—G. F. WALTON, 808 West Olney Road, Norfolk, Va.

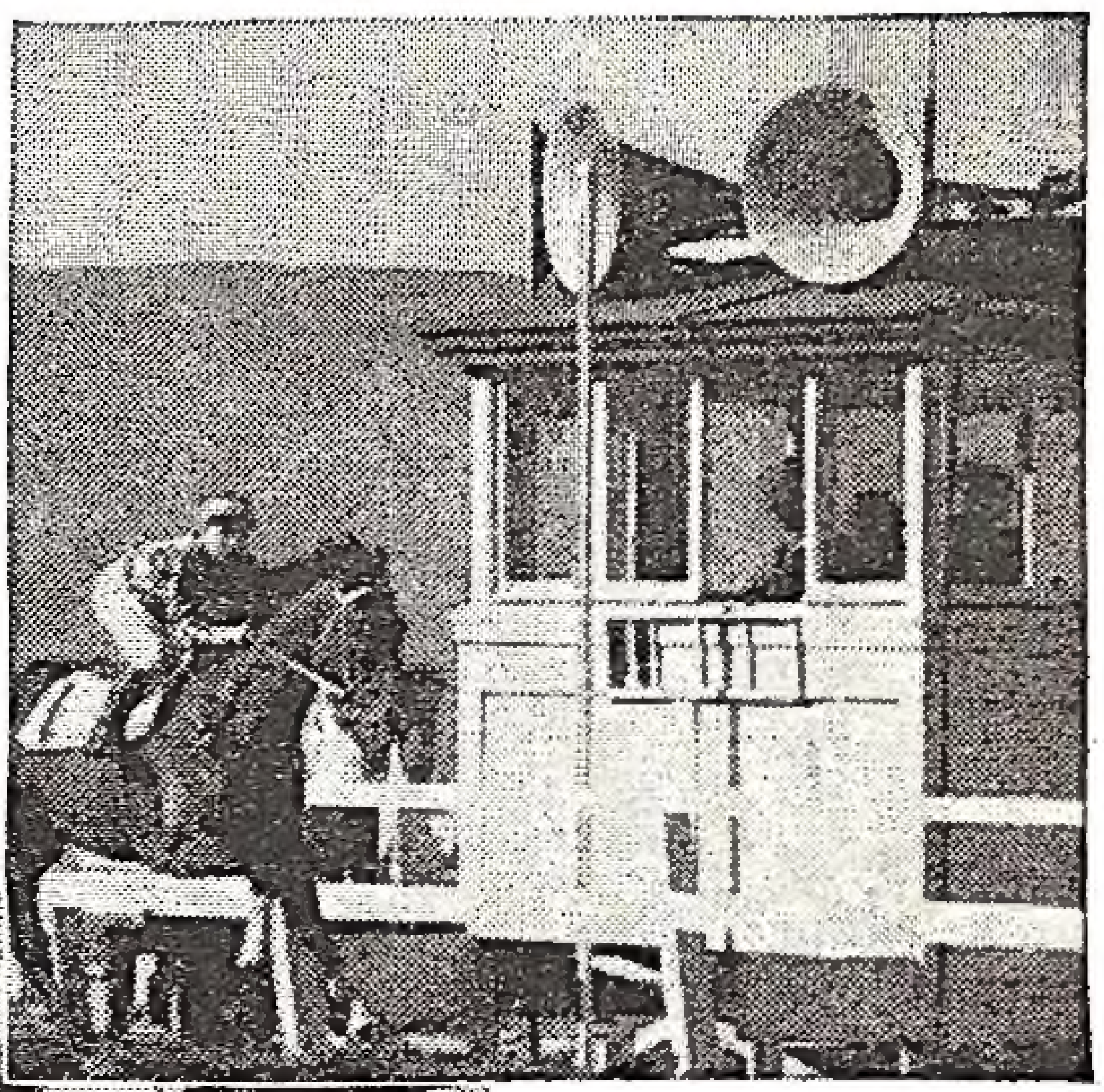
THE TESTED WAY TO

EXPERT



Set Servicing

Spare time set servicing pays many $5, $10, $15 a week extra while learning. Full time servicing pays as much as $30, $50, $75 a week.



Broadcasting Stations

Employ managers, engineers, operators, installation and maintenance men for fascinating jobs and pay up to $5,000 a year.

Loud Speaker Systems

Building, installing, servicing and operating public address systems is another growing field for men well trained in Radio.

Automobile Radio

Another new Radio field — selling, installing, servicing. One million or more auto owners will install radio sets within the next year.

I Give You Practical Experience

My Course is not all book training. I send you special Radio equipment and show you how to conduct experiments and build circuits which illustrate important principles used in modern Radio receivers, broadcast stations and loud speaker installations. I show you how to build testing apparatus for use in spare time work from this equipment. This 50-50 method of training makes learning at home interesting, fascinating, practical.

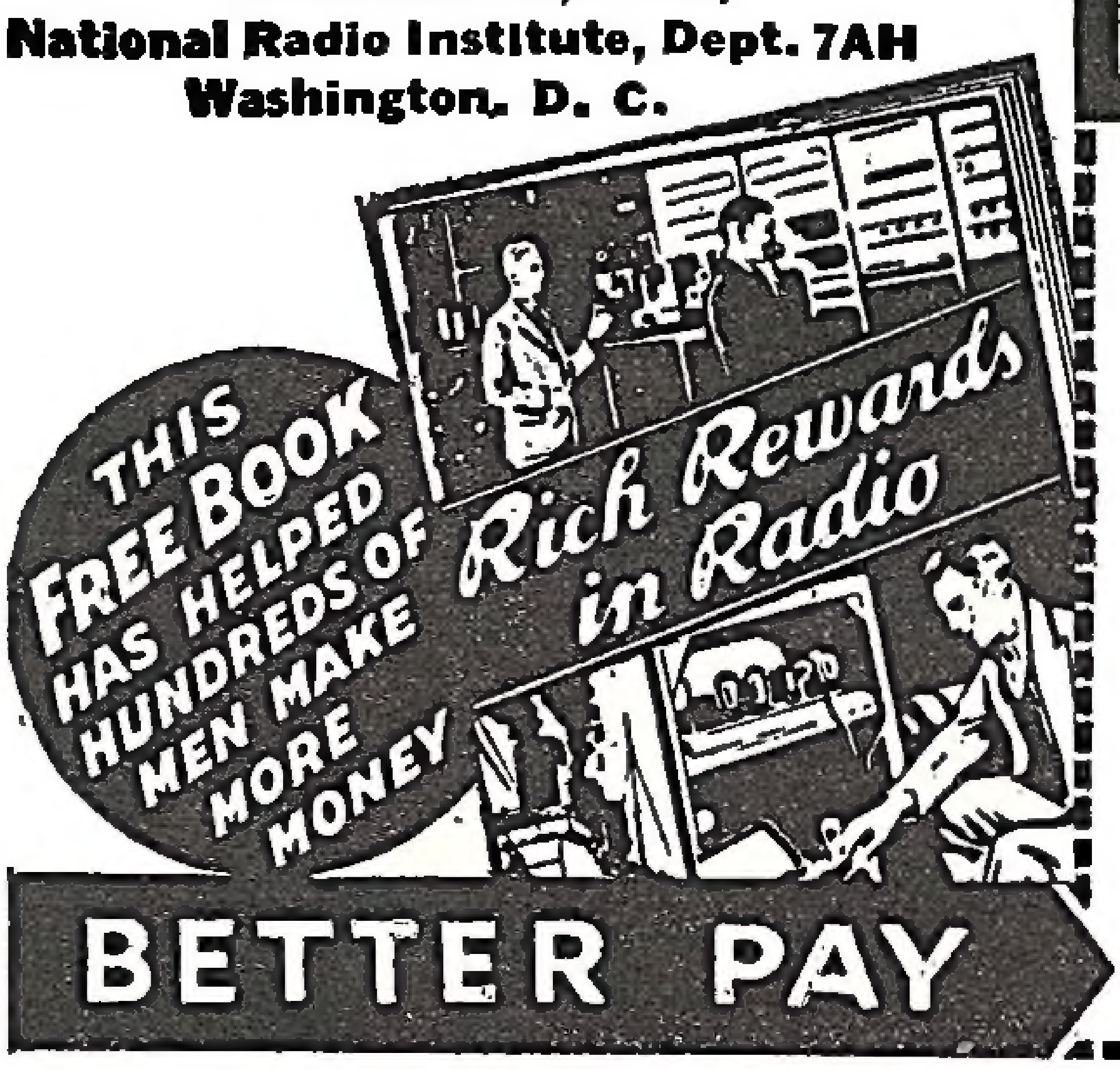
You Get a Money-Back Agreement

I am so sure that I can train you successfully that I agree in writing to refund every penny you pay me if you are not satisfied with my Lessons and Instruction Service when you finish. I'll send you a copy of this agreement with my Free Book.

Find Out What Radio Offers You

Act Today. Mail the coupon now for "Rich Rewards in Radio." It's free to any fellow over 16 years old. It describes Radio's spare time and full time opportunities and those coming in Television; tells about my training in Radio and Television; shows you actual letters from men I have trained, telling what they are doing and earning. Find out what Radio offers YOU! MAIL THE COUPON in an envelope, or paste on a postcard—NOW!

J. E. SMITH, Pres.,
National Radio Institute, Dept. 7AH
Washington, D. C.



THIS FREE BOOK HAS HELPED HUNDREDS OF MEN MAKE MORE MONEY
Rich Rewards in Radio
BETTER PAY

Mail this to get 64 page Book FREE

Mr. J. E. SMITH, President, Dept. 7AH
National Radio Institute, Washington, D. C.

Dear Mr. Smith: Without obligating me, send "Rich Rewards in Radio," which points out the spare time and full time opportunities in Radio and explains your 50-50 method of training men at home in spare time to become Radio Experts. (Please Write Plainly.)

NAME ....AGE ....

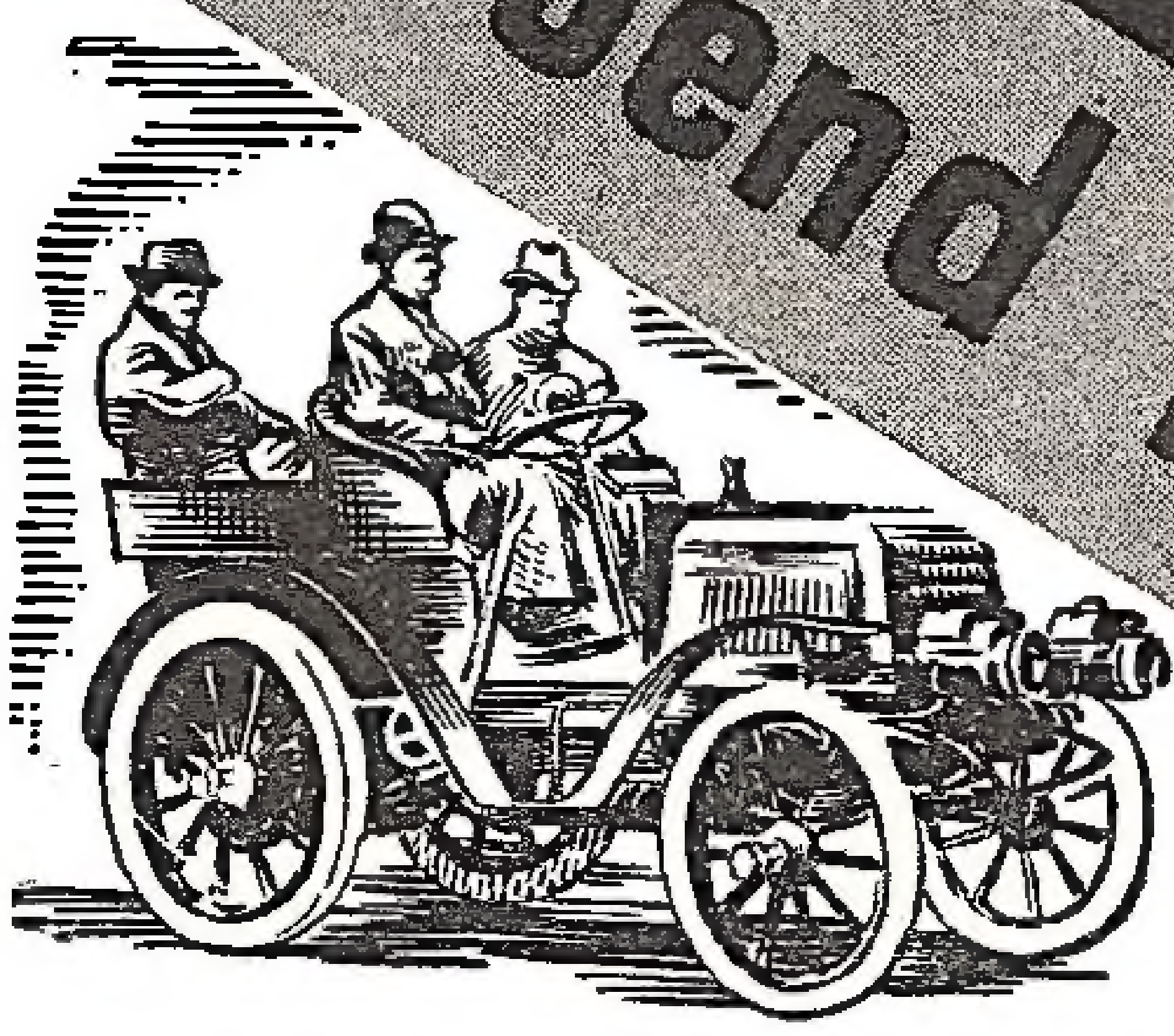
ADDRESS ....

CITY ....STATE ....

David Sarnoff says:

INVENTORS Send for Valuable Facts *about*

DAVID SARNOFF, once a poor lad and now the famous President of the Radio Corporation of America, in an article in Liberty Magazine states: "Civilization means elimination of unnecessary labor. The sewing machine and the vacuum cleaner save millions of women from backbreaking toil. The tractor makes the farmer's life bearable. The automobile lends wings to us all. The airplane is our magic carpet. It would be madness to slow up invention because our trouble is not that mechanical science moves too speedily, but that the governmental and social sciences move too slowly . . . In a world reorganized to vibrate within certain wave bands, human intelligence will be able to distribute equitably nature's bounties from above and below, and make princes of paupers."



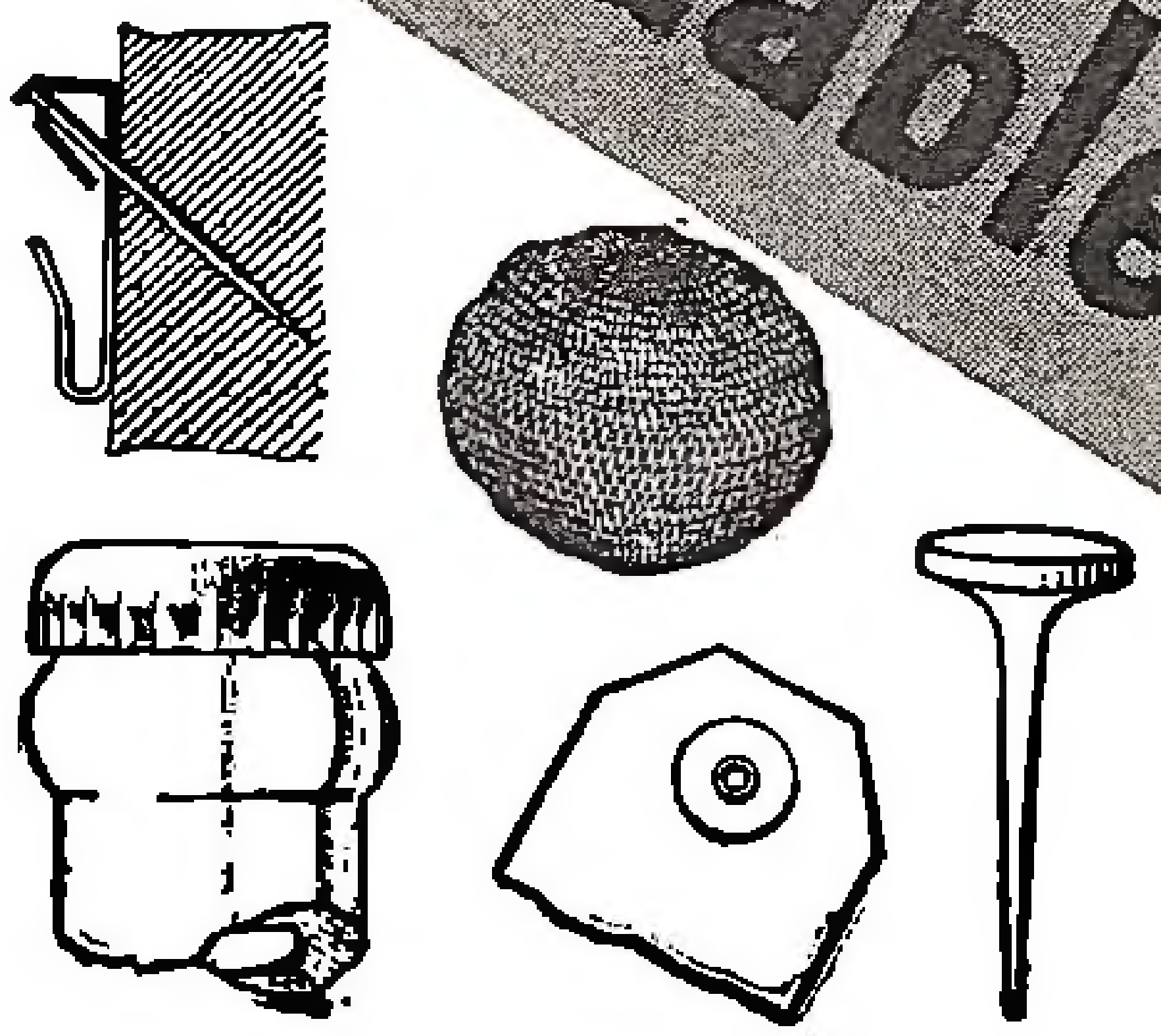
Since the "Horseless Buggy" Days, We Have Helped Inventors

PERHAPS you have already heard about our firm, because one client tells another—and we have served men in every state in the Union, and in nearly every foreign country. We have been working with inventors since 1898. If you have a good invention—or an idea for one—and don't know what Victor J. Evans & Co. can do for you, NOW is the time to find out.

How We Can Help You

Both the Patent Office and the U. S. Supreme Court have made it clear that the inventor needs the assistance of a competent patent lawyer when it comes to protecting an invention. It is one thing to think up a good invention—it is another to get effective patent protection on it.

For more than a third of a century—it has been our business to give sound advice and counsel to inventors. Our free books (described on the opposite page) tell what steps to take first, how to protect yourself, how the laws protect you, what you must do, when to offer your invention for sale, how others have succeeded, and much more. You need this information.



Simple Inventions May Have Excellent Commercial Possibilities

FREQUENTLY inventors confuse the size or the complication of a device with the question of commercial value and patentability. These two factors, of course, have no relation to each other. Most of our present-day complicated machines represent a process of evolution, a series of inventions. On the other hand, every so often some inventor comes along with a very simple "gadget" which possesses the elements of broad utility and is patentable. Some of the most profitable inventions have been of this latter class. Shown above are a few such examples. Whether a device is simple or complex, if it represents a forward step to save manufacturing costs, to save labor, or to add enjoyment to human life, it may prove patentable and profitable. This subject is more fully discussed in the booklet entitled "Patent Protection" shown on the opposite page.

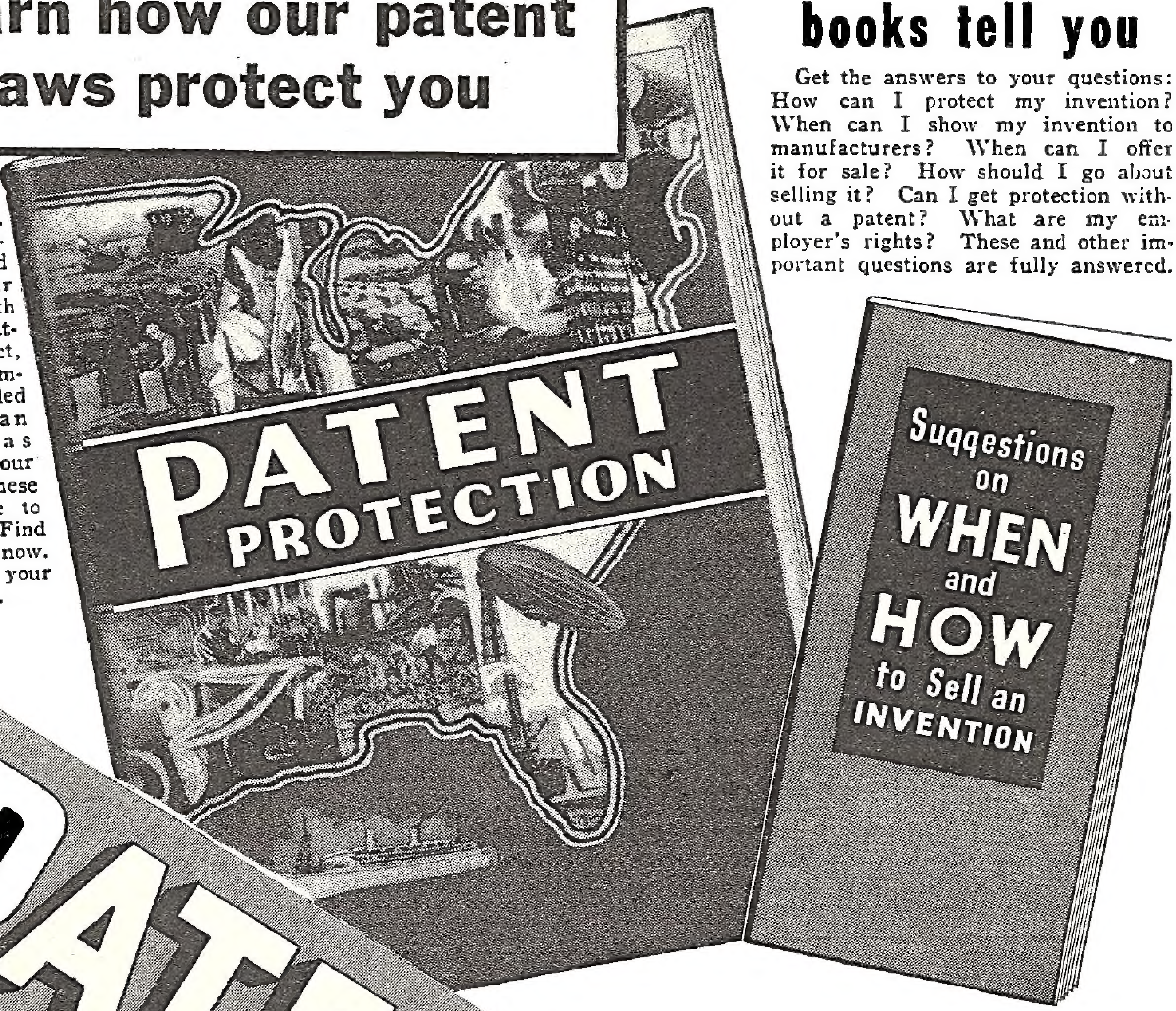
1937
SUN
MON

What Will Be Next?

EVER since George Washington signed the first patent, America has led the world in inventions. It may be said that not a year has gone by without some important inventions being patented and commercialized. David Sarnoff, president of the Radio Corporation of America, sees a big future ahead for science and invention. Just as sure as the sunrise, 1937 will see new inventions come out—new wealth made from patents. Your idea may be one of them. You never can tell. For this reason you should send for our books today and get the facts about patents and inventions.

Learn how our patent laws protect you

The U. S. has liberal patent laws, and much of our national wealth is based on patents. In fact, a Japanese commission decided that American progress was mainly due to our patent laws. These laws are made to protect you. Find out about them now. This is for your own good.


PATENT PROTECTION
Suggestions on WHEN and HOW to Sell an INVENTION

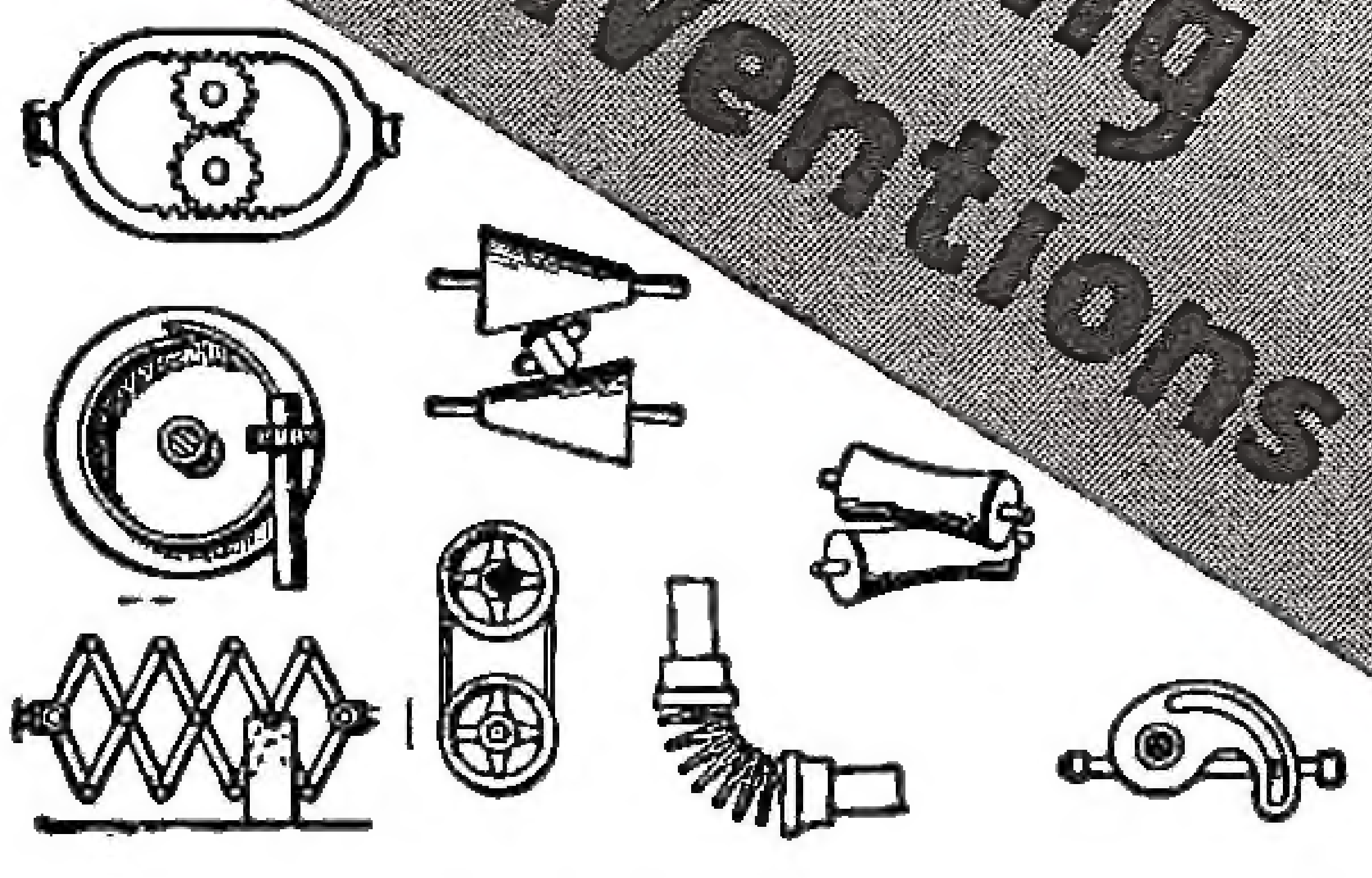
These FREE books tell you

Get the answers to your questions: How can I protect my invention? When can I show my invention to manufacturers? When can I offer it for sale? How should I go about selling it? Can I get protection without a patent? What are my employer's rights? These and other important questions are fully answered.

PATENTS and Selling Inventions

Mail Coupon Today

Delays are dangerous. If you have a good invention you should get protection for it just as soon as possible. Don't turn this page until you have clipped and mailed this coupon—you will hear from us by return mail.



115 Mechanical Principles Shown

Request the book "Patent Protection" (sent free to inventors). Not only does it tell you what to do for protection, and how to do it—it also shows you 115 different mechanical movements that you may use in developing your own inventions. Inventors tell us they have found these useful.

VICTOR J. EVANS & Co.

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Send me FREE copies of your books, "Patent Protection" and "When and How to Sell an Invention." (Note: Same books supplied by any of branch offices listed above.)

Name ....

Street and No. ....

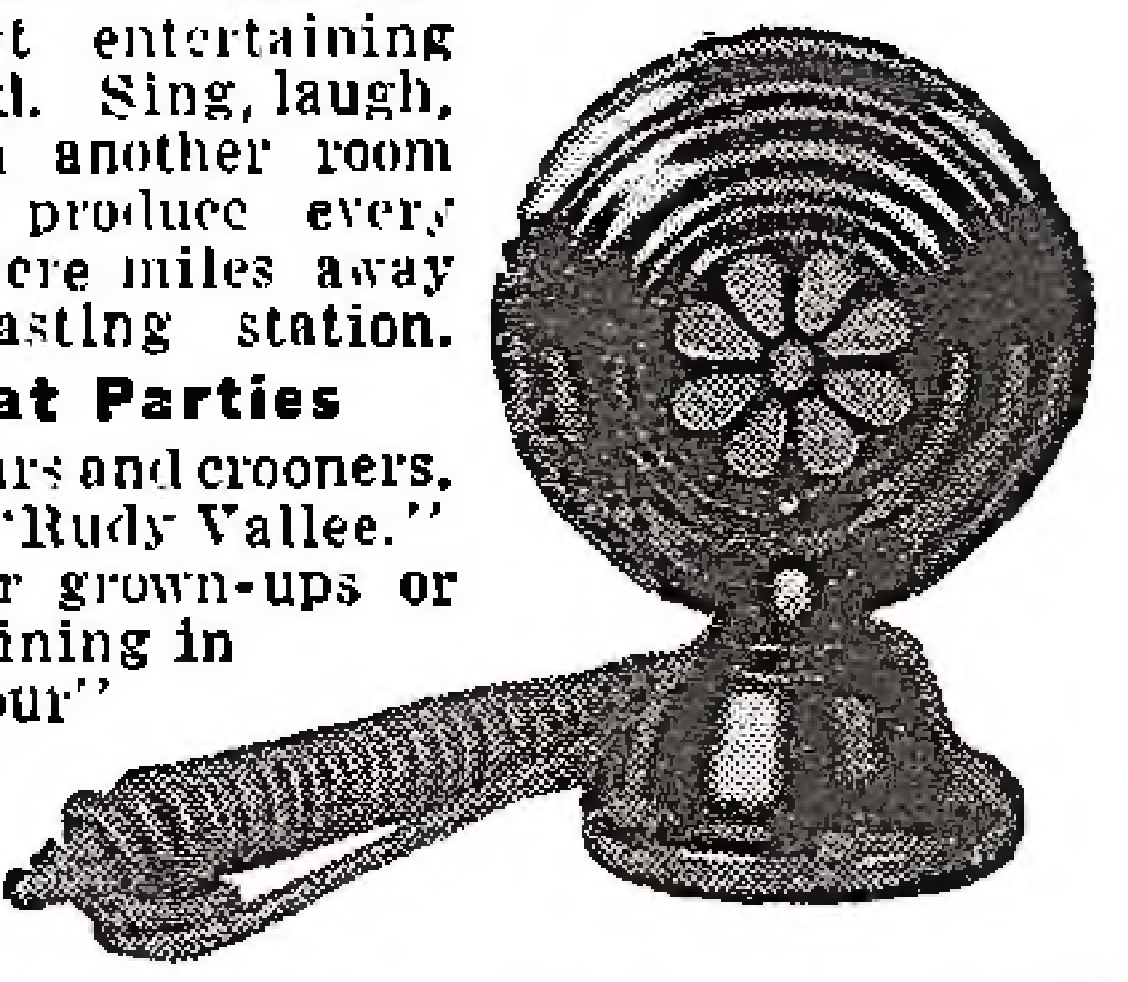
City or Town ....

BROADCAST
and AMAZE
Your Friends!

Put on your own broadcast with the WALCO MIKE, most entertaining radio device yet produced. Sing, laugh, talk, crack jokes from another room and your radio will produce every sound as though you were miles away at a regular broadcasting station.

Marvelous Fun at Parties

Imitate the big radio stars and crooners. Do a "Ben Bernie" or "Rudy Vallee." No end of pleasure for grown-ups or kiddies. Excellent training in elocution, "Amateur Hour" practice, or broadcast announcing. Special cut-out button allows you to switch from home broadcasting to regular radio reception in an instant. Can not injure your radio in any way.



THE WALCO MIKE
In handsome black metal. Long cord. Less than a minute to attach to any radio without tools. Fully guaranteed.
ONLY $1

Send No Money

5 Days Trial at Our Risk
Merely mail the coupon. On delivery pay postman $1 plus few cents postage. If not delighted return it in 5 days and your $1 refunded at once.

ELECTRICAL LABORATOR ES CO., Dept. 61
49 East 21st St., New York, N. Y.

Send Walco Mike, with complete instructions. Will pay postman $1, plus few cents postage. If not delighted, will return in 5 days for $1 refund.

☐ Check here if ENCLOSING $1—thus saving postage charge. Same refund guarantee applies.

Name ____________________

Address ____________________

☐ Check here if you prefer chromium plated De Luxe model. Price $1.39.

FUN for EVERYONE
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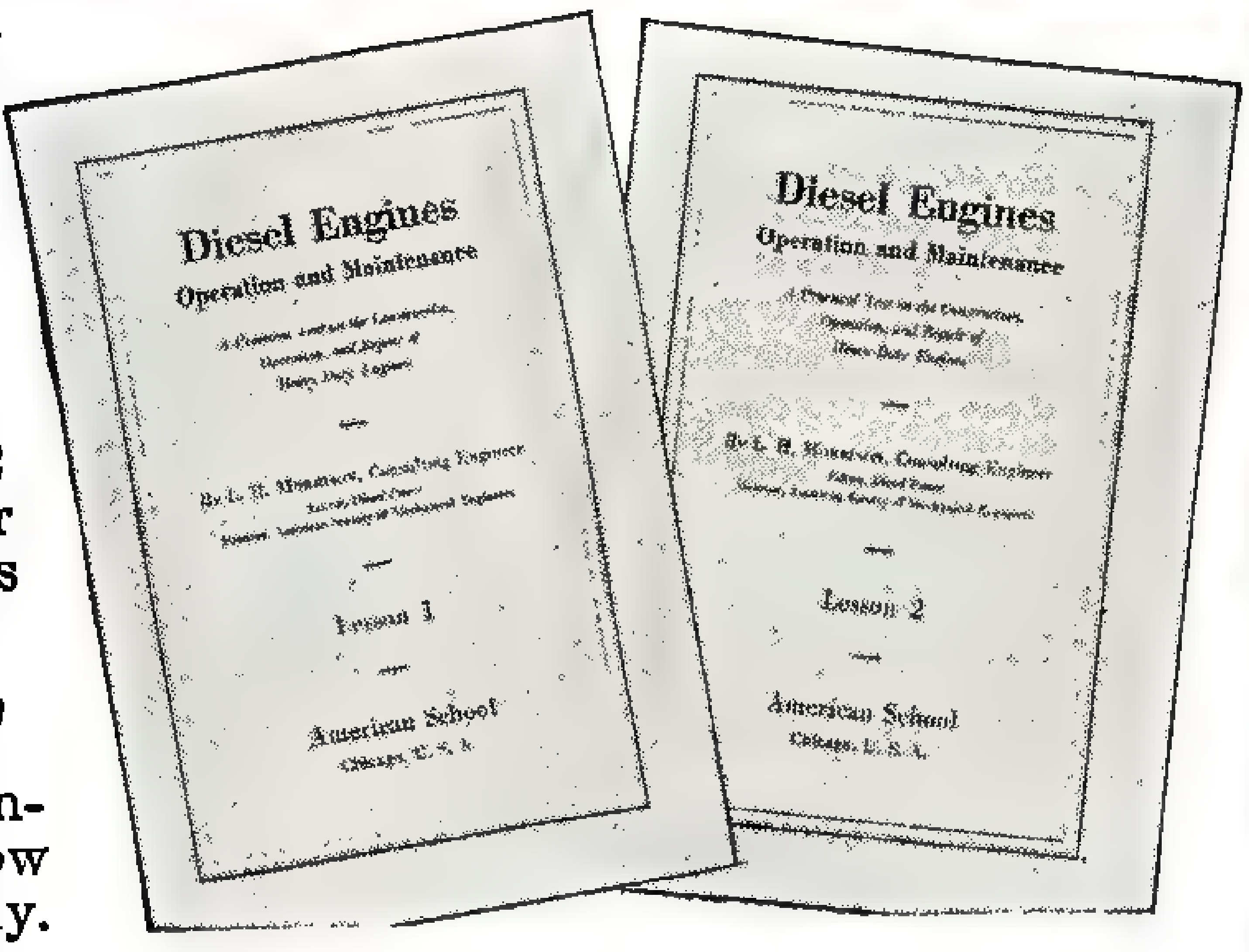

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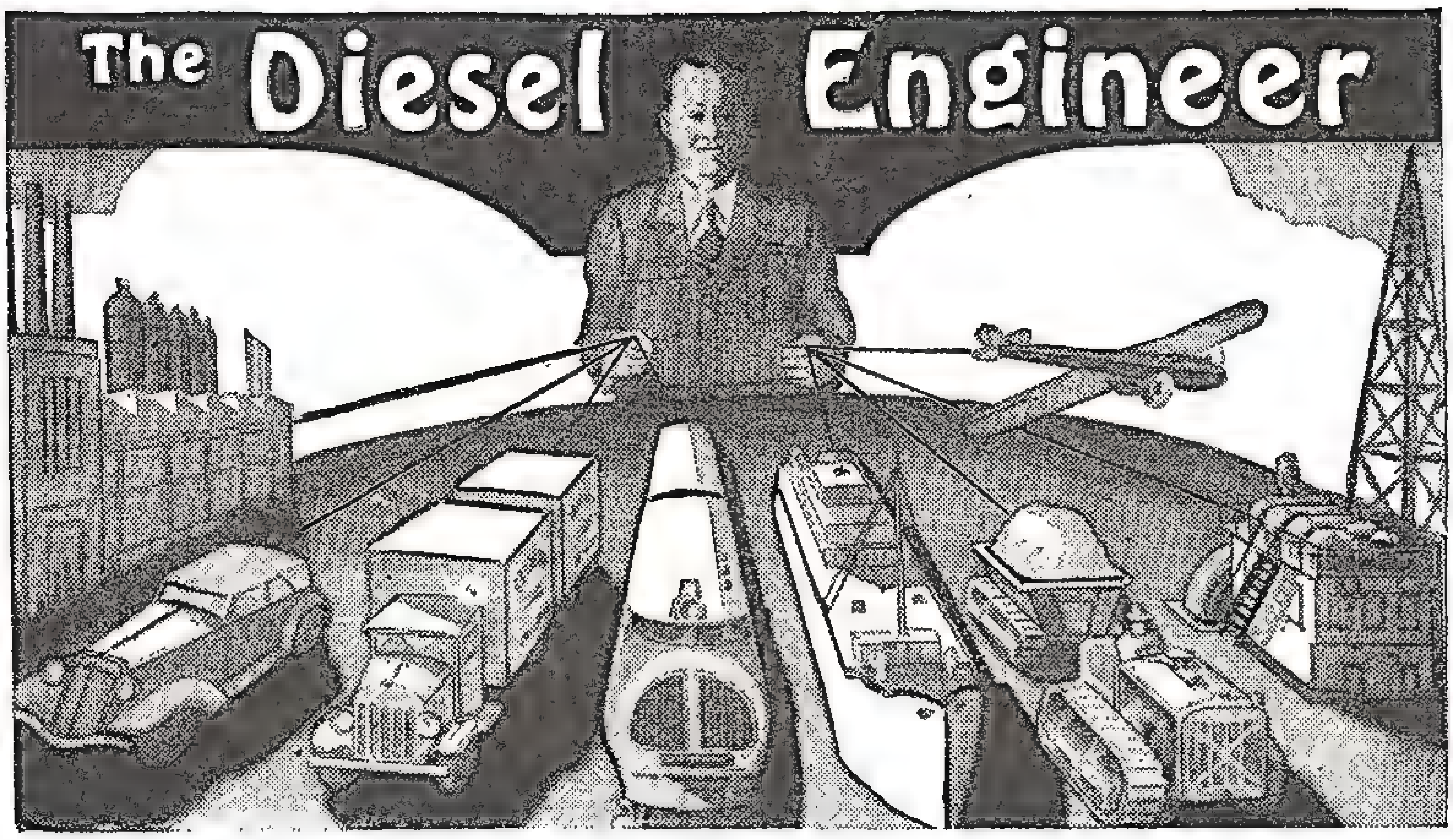

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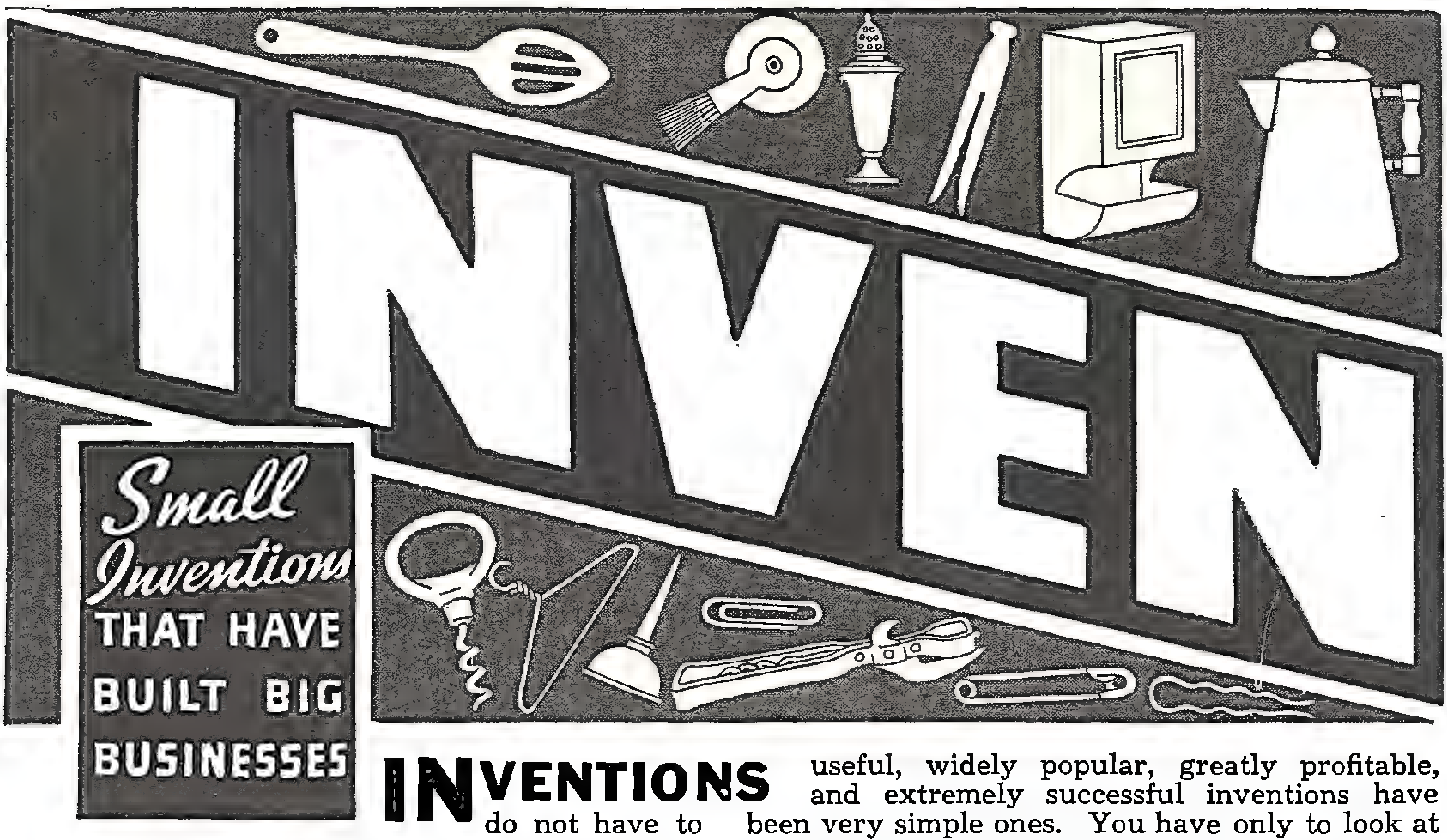

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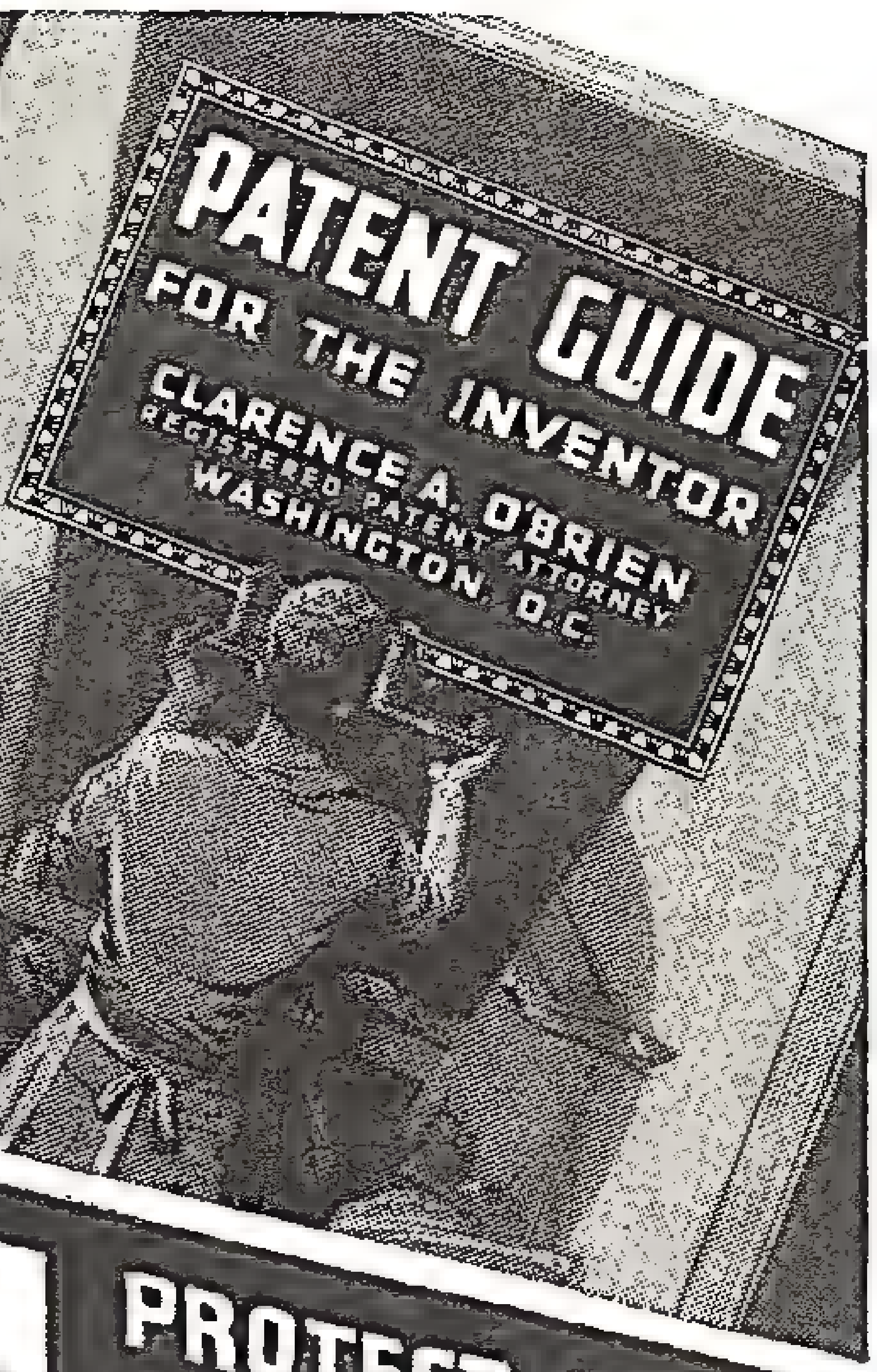

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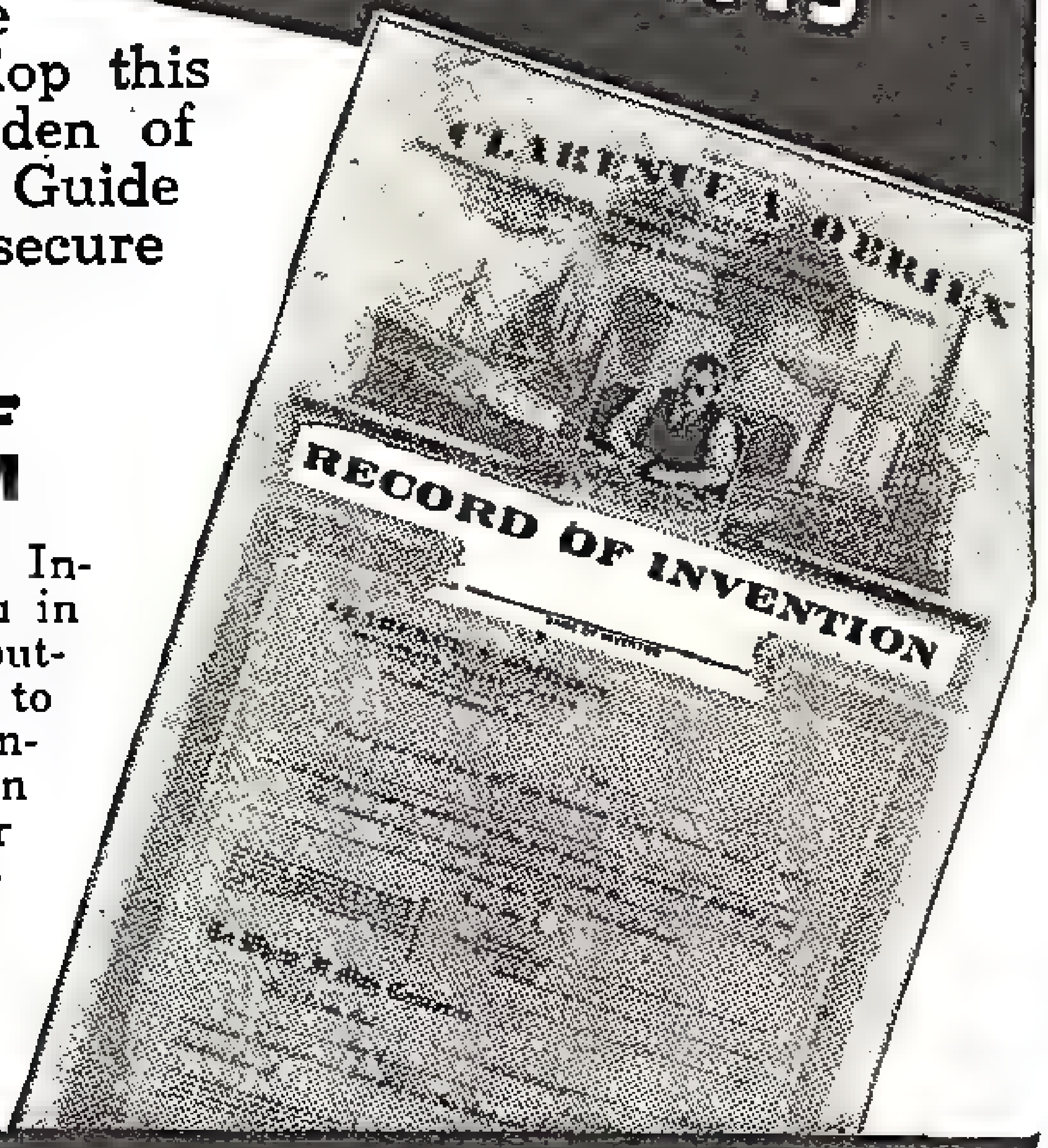

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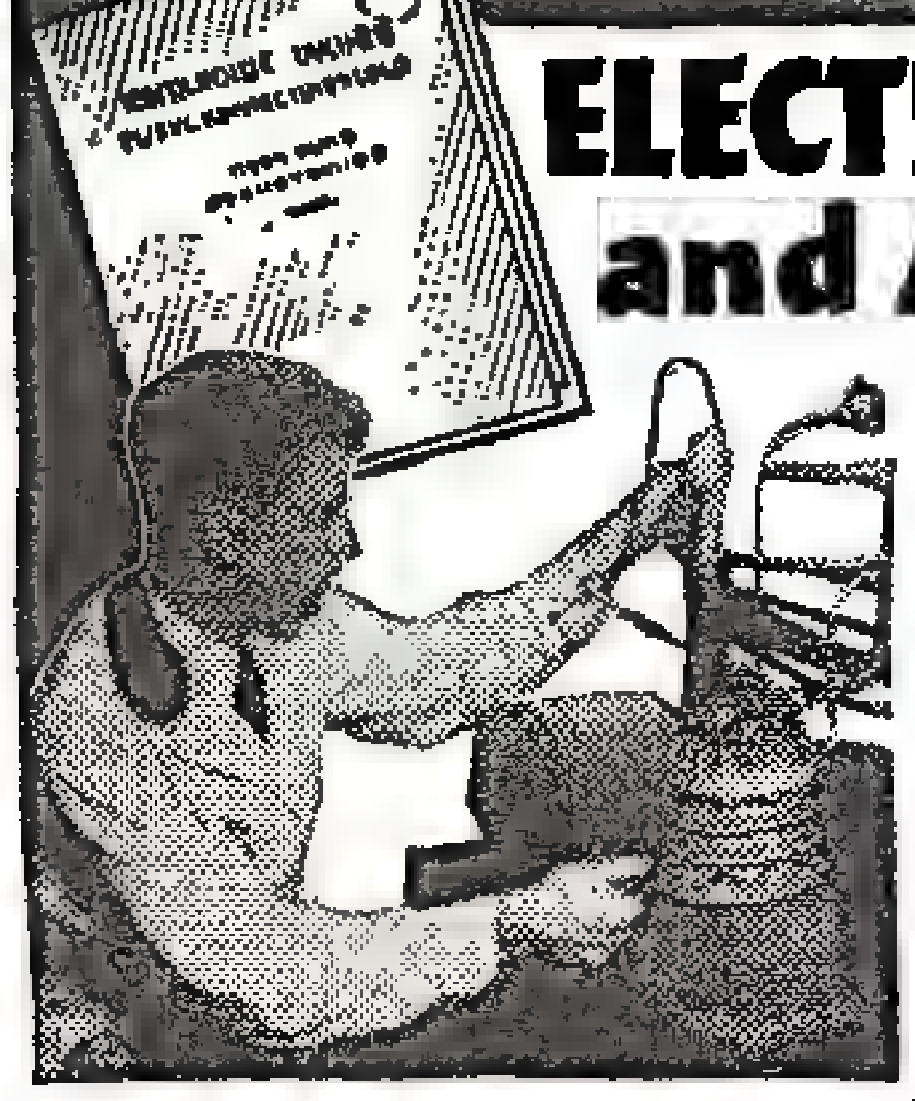

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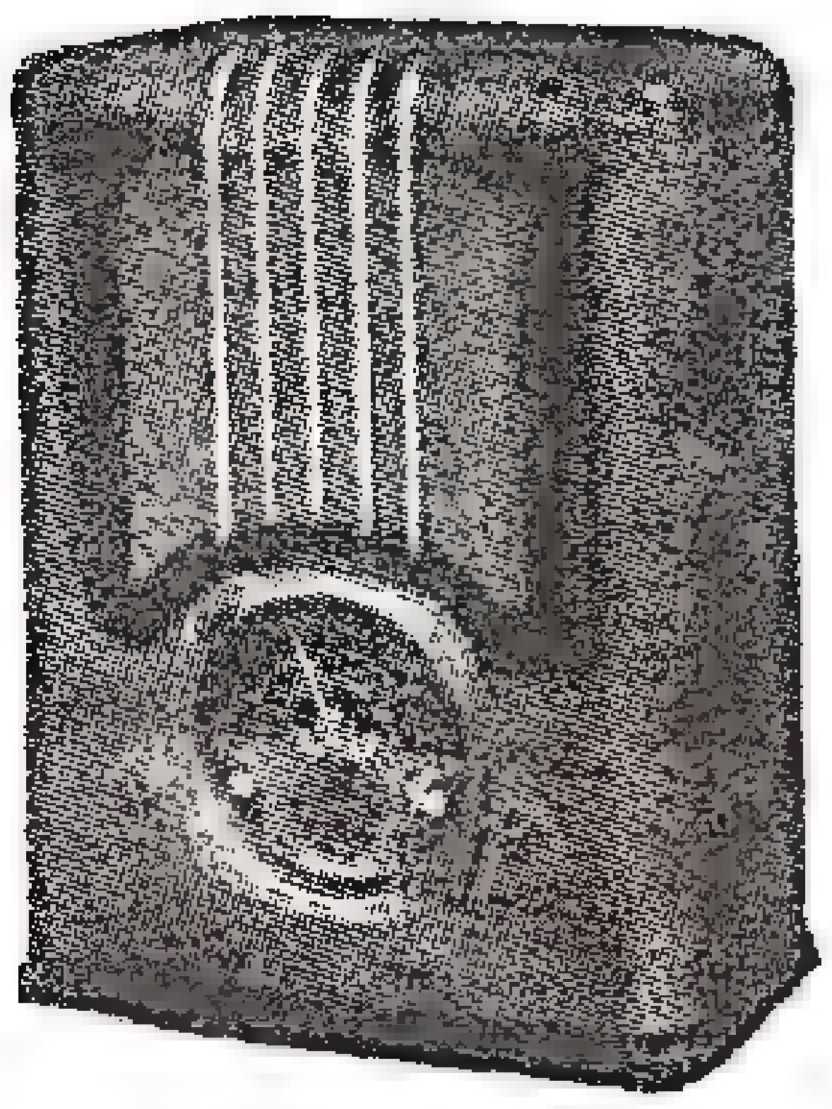

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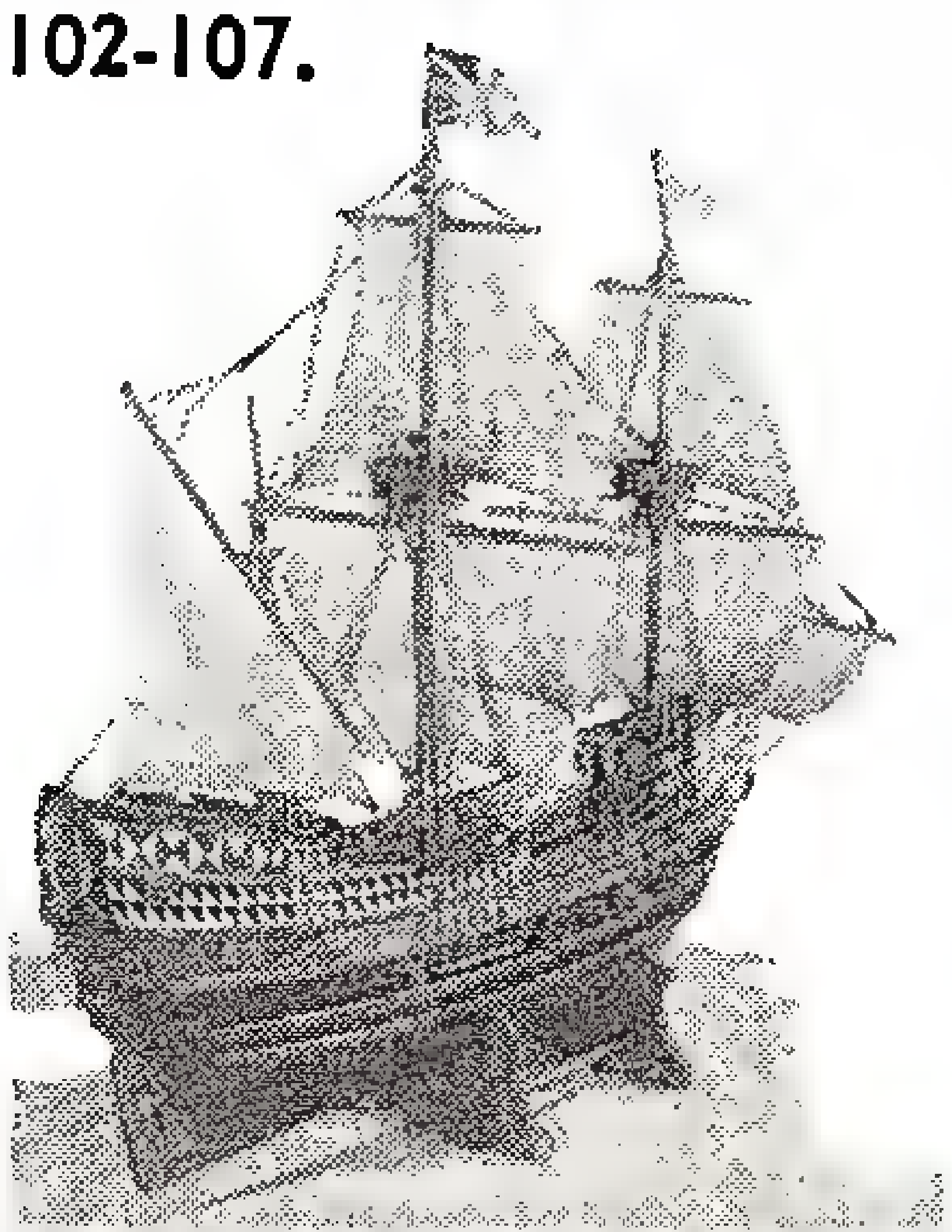

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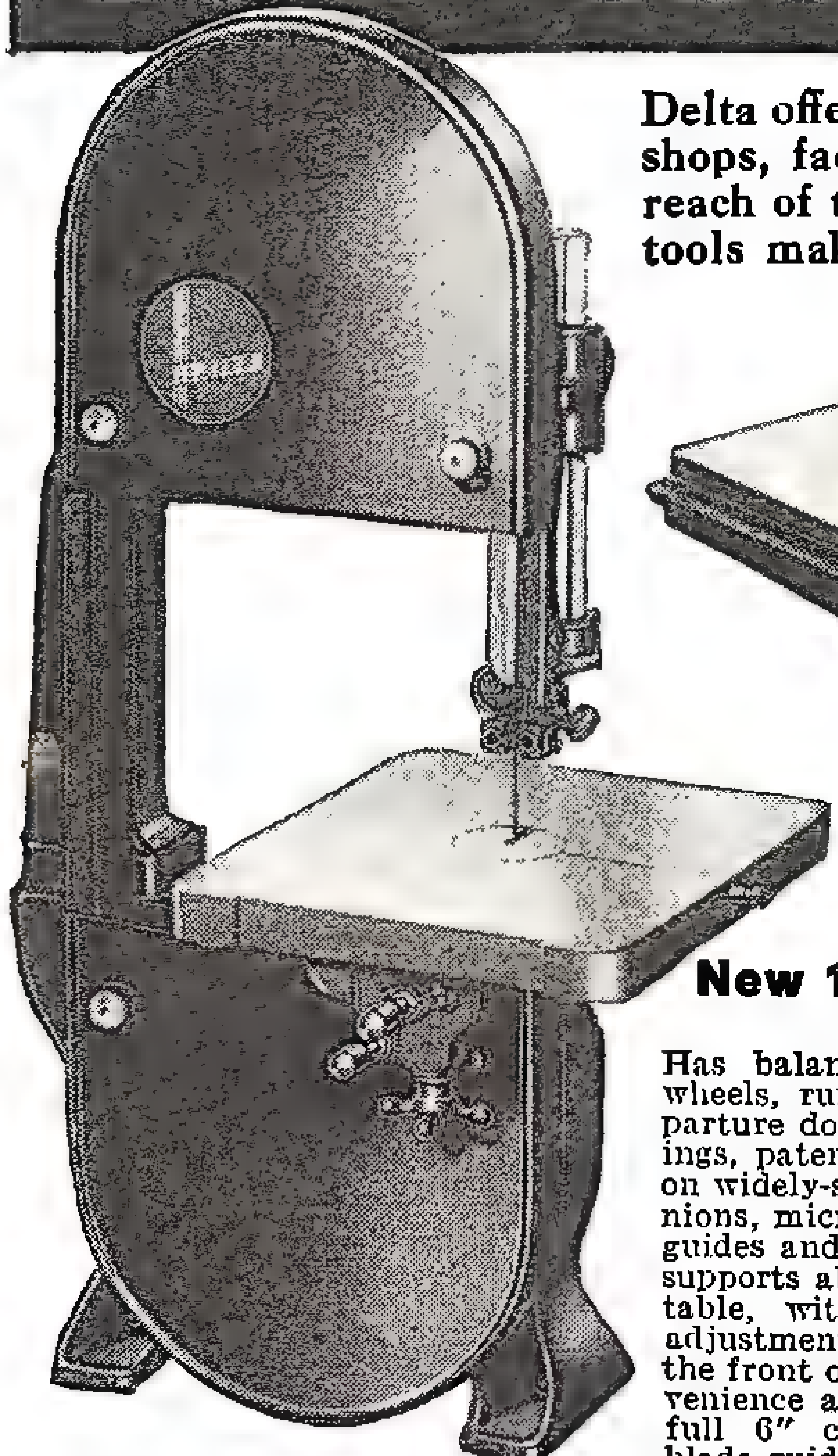

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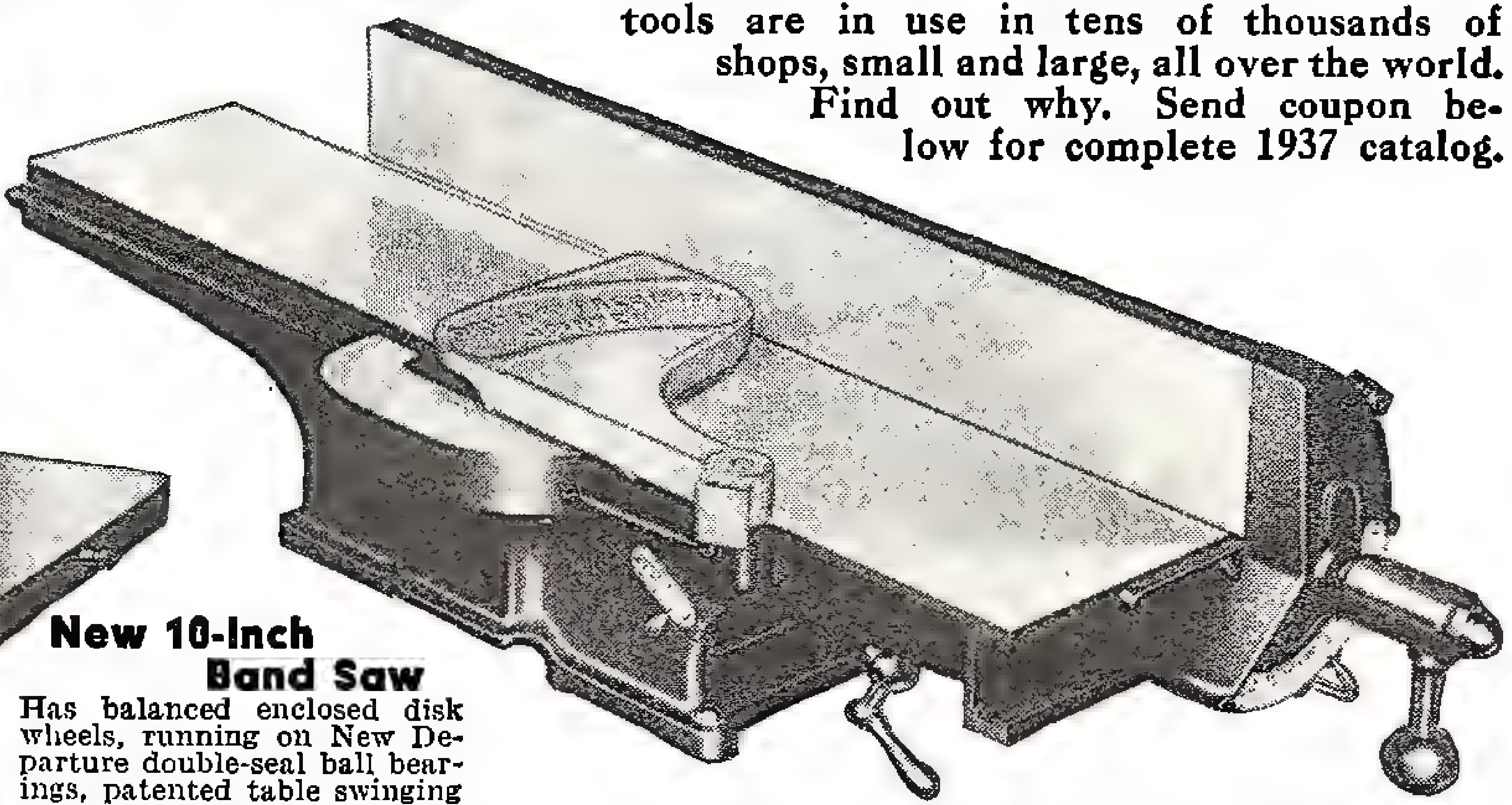

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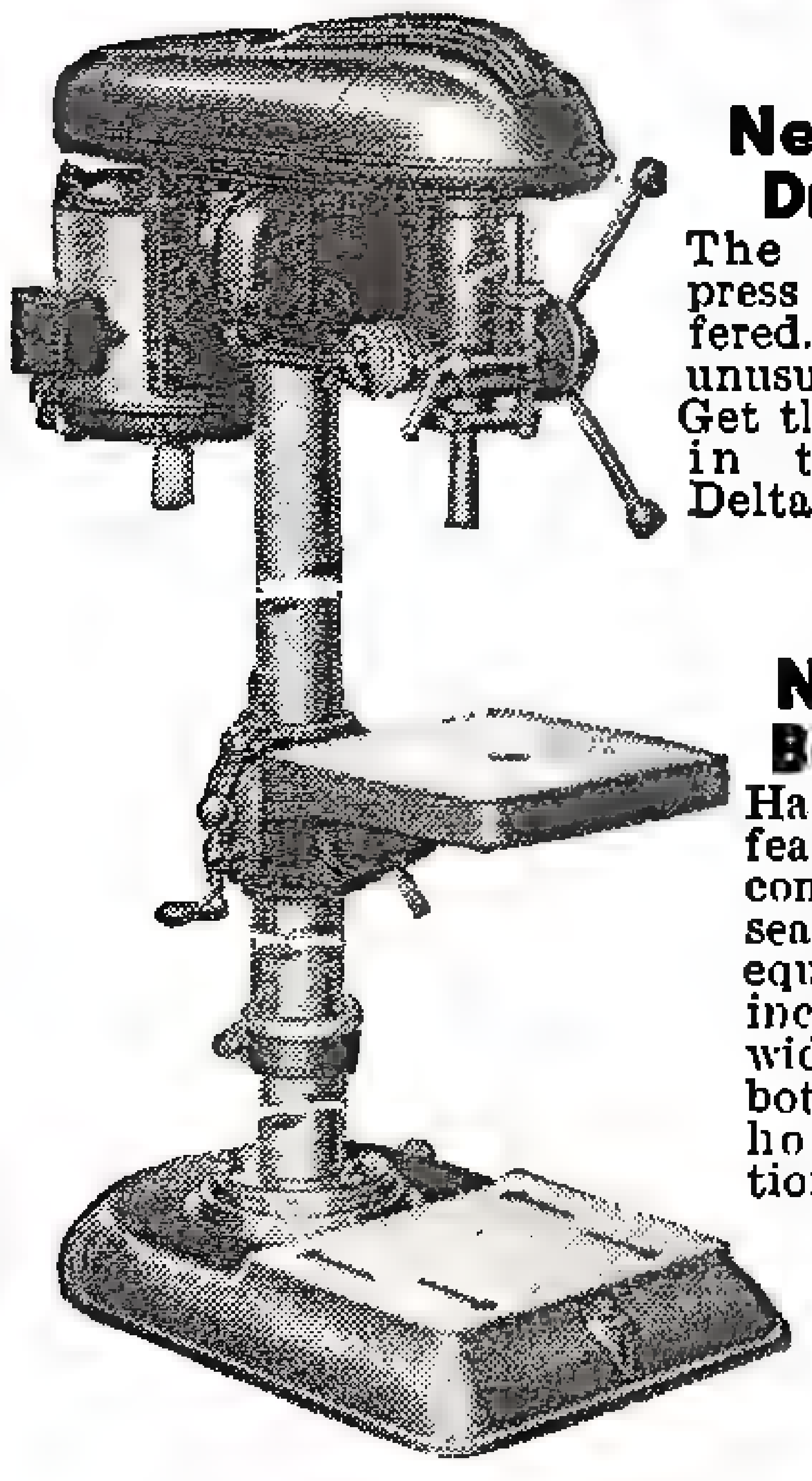

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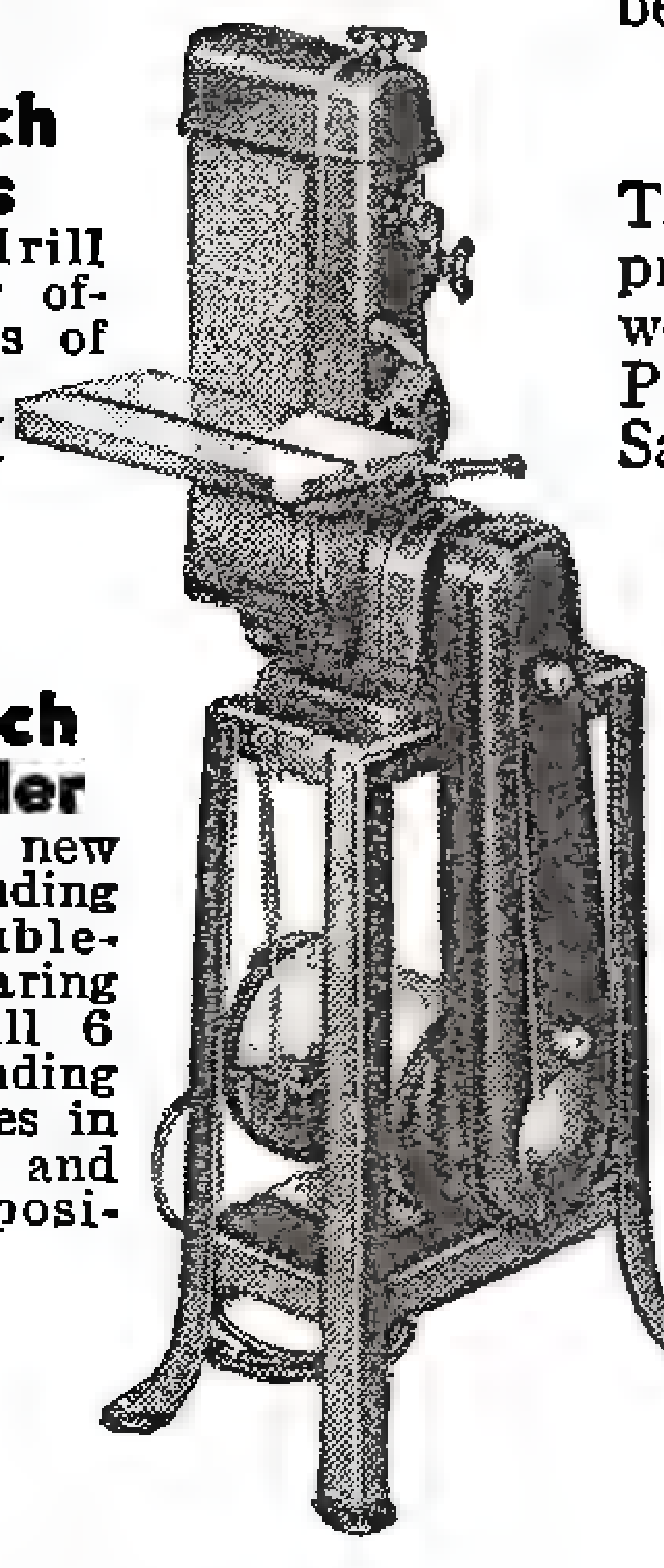

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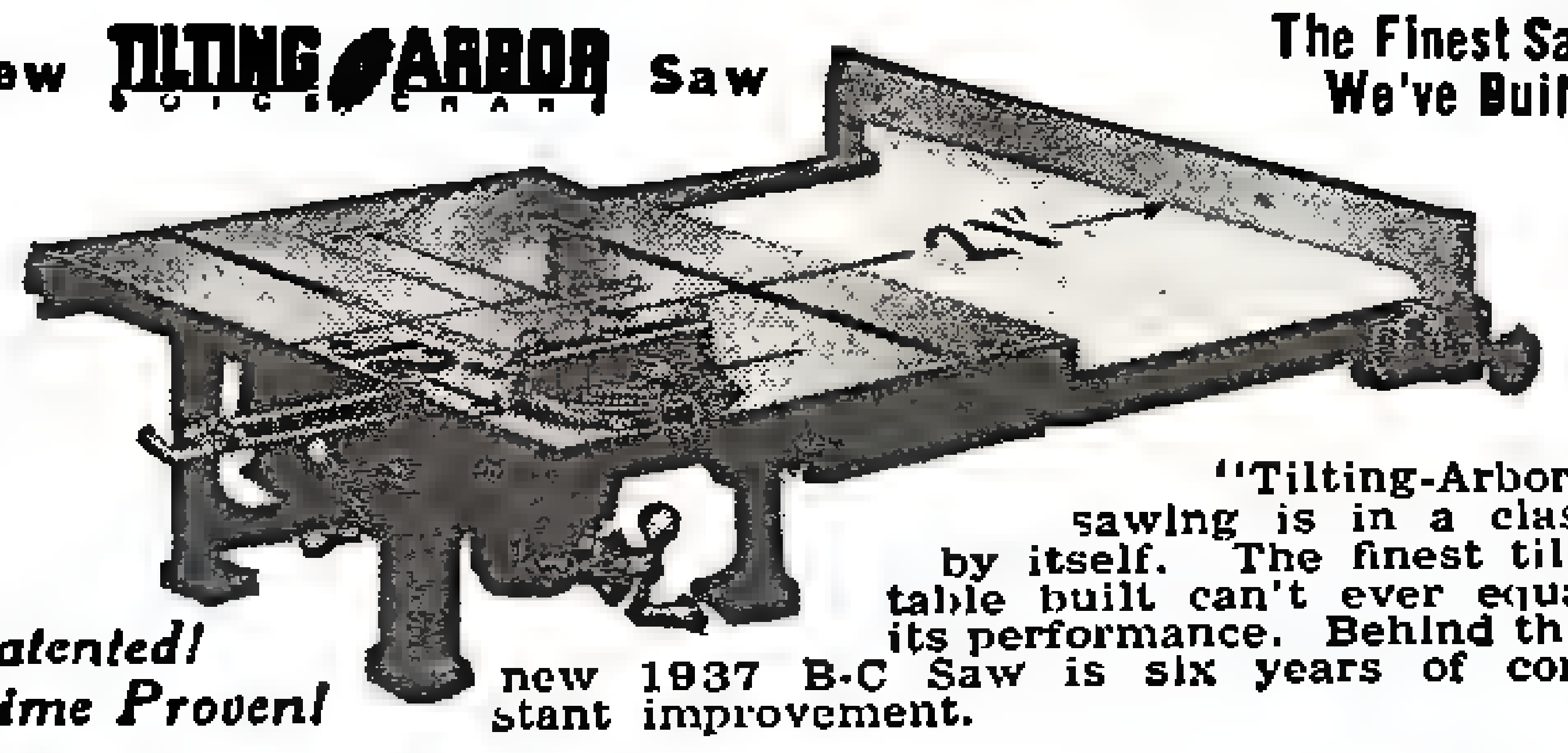

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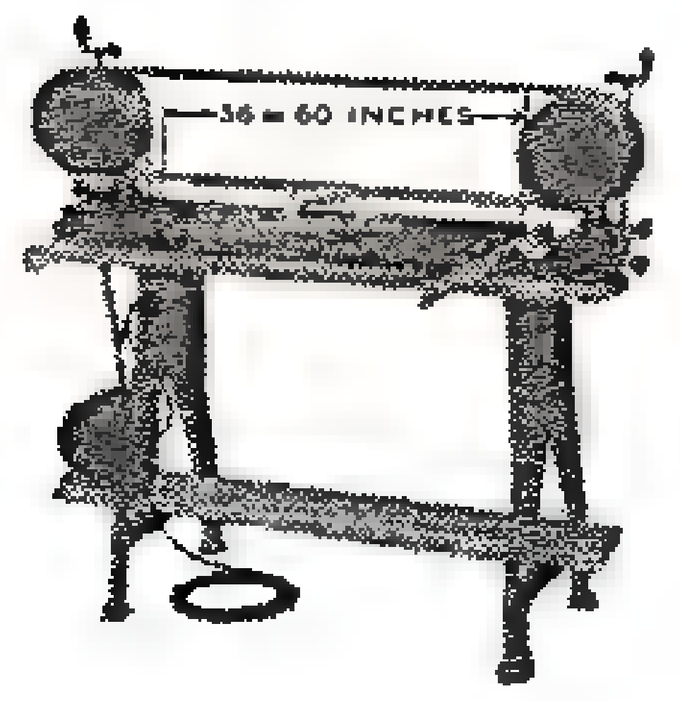

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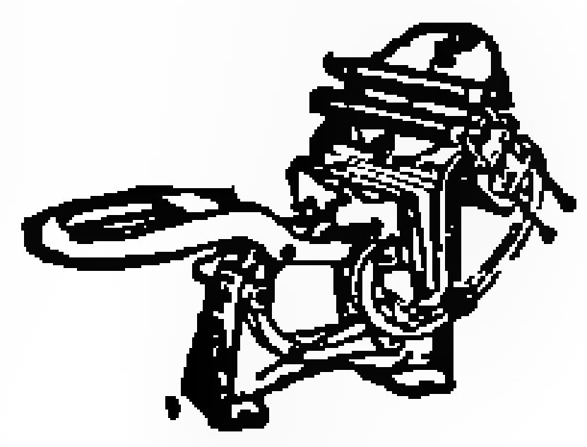

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If you're dissatisfied with small pay—lay-offs and an uncertain future—here's an opportunity that's too good to miss. At the cost of only the time it takes you to mail the coupon, you can get my big FREE book, "RADIO'S FUTURE AND YOUR OPPORTUNITY." This book tells how you can learn at home under the supervision of factory engineers, to make more money almost at once in Radio—whether you want to make Radio your life's work, or use it to pick up an extra $5 to $20 a week in your spare time.

TRAIN NOW FOR GOOD PAY FULL-TIME AND SPARE-TIME JOBS THAT PAY UP TO $75 A WEEK (and more)

Radio is still forging ahead. 1936 beats all other years. Over 6 million new sets sold. Over 30 million dollars paid for service alone in 1935. Where only a few hundred men were employed a short time ago, thousands are employed today. And where a hundred jobs paid up to $75 a week—there are thousands of such jobs today—many paying even more. And new jobs are being created all the time—**full time jobs and spare time jobs.** Get my book and see how easy it is to learn at home for this good-pay work.

"Shop Training" for the Home

R-T-I Training is different than any training you ever heard about. It comes to you right from the heart of the Radio Industry—right out of the factories where Radio sets and other vacuum-tube devices are made. It was planned and prepared and is supervised by big radio engineers IN these factories—by men appointed for the purpose. This means that trained the R-T-I way, you'll be trained as the Radio Industry wants you trained—just as the Radio Industry, itself, would train you if it was doing the job.

Television, Photo Electric Cells, Public Address Systems Included

Radio service work is only the starting point in R-T-I Training. From there it will take you through the whole field of Radio and Electronics. You will learn about every new development, including Television, so you'll be ready when Television breaks. You'll also learn the big money subjects such as Aviation and Auto Radio; Public Address Systems; how to handle Photo Cells; Sound Picture Recording, Etc.

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Start almost at once doing part time radio work. I furnish 4 outfits of apparatus that you build into test equipment with which you can do actual jobs and earn extra money. My Training pays its own way and you get your money back if not satisfied.

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INVESTIGATE! Learn why R-T-I Training is different. Find out why R-T-I Trained men get "Quick Results" and "Big Results." Send for your copy of "Radio's Future and Your Opportunity" today. It tells you about Radio's amazing opportunities. It describes my approved training. It tells what R-T-I students are doing and making. It gives the history of my Advisory Board and 50 endorsing manufacturers. It's FREE. Clip, sign and mail coupon RIGHT NOW!

RAY D. SMITH, President

RADIO AND TELEVISION INSTITUTE

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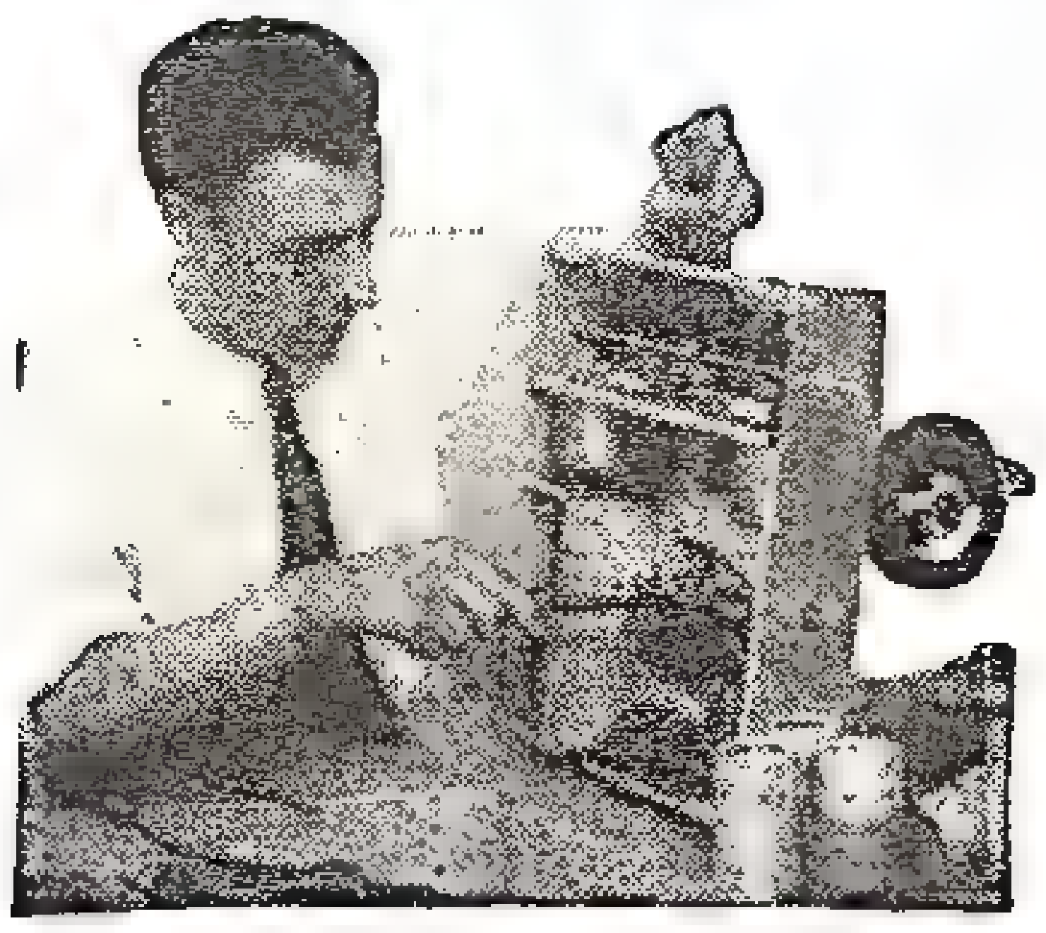
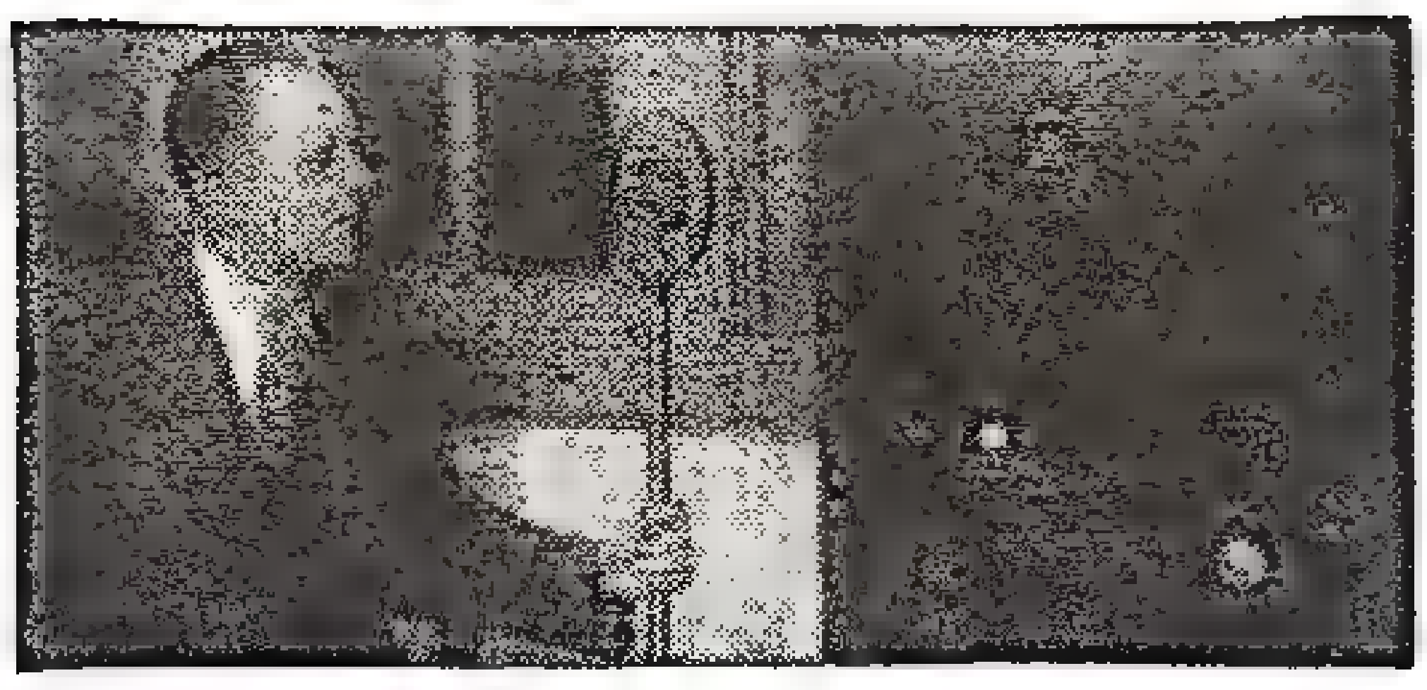
HAS MADE $250 IN RADIO IN ONE WEEK



Wm. T. Ridd, Verdun, P. Q., Canada, formerly an $18 a week car washer, averages more than $75 a week as an R-T-I Trained man. He says: "Have made $250 in single week. R-T-I is entirely responsible for my success."



STARTING SALARY HIGHEST HE EVER EARNED

Harold Apley, 2658 Brookside Ave., Indianapolis, made as high as $30 a week in spare time while getting his R. T. I. training. Starting on a regular job, obtained because of his training he said: "This job is starting me in at better pay than I ever got on any job before."

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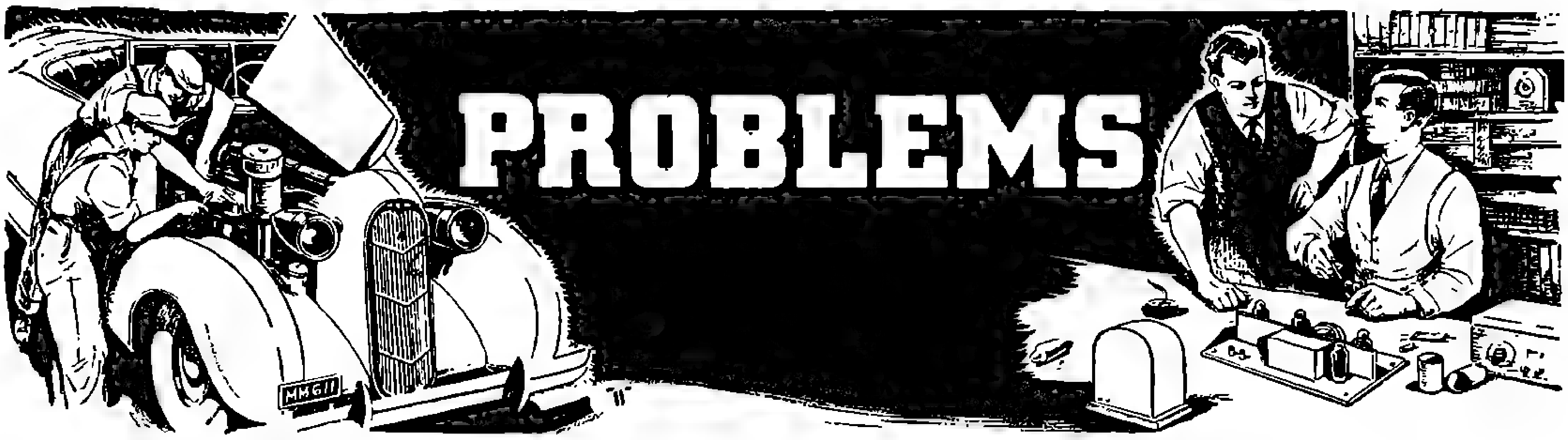
City ______________________ State ______



PROBLEMS

EDITORS ANSWER READERS QUERIES

REDUCING ELECTRIC STOVE'S HEAT

I have an inexpensive electric heating plate which at present consumes 500 watts of electricity. Since the heat produced is excessive for my requirements I should like to reduce the wattage consumption by $1/3$. Should I add more resistance wire to the grill, take some off or should a transformer be placed in series with one of the heaters' wires in order to reduce the current?—Paul Bartholomae, Chicago, Ill.

If there is sufficient room for it in the grill more nichrome resistance wire can be added to the heating unit until the desired temperature is attained. Otherwise this resistance will have to be wound on a separate porcelain form and mounted externally. If a gradual current increase is desired a brine rheostat may be used. This is nothing more than a gallon crock filled with a salt solution and in which metal rods are suspended. The rods are connected in series with one of the heater leads and increase the current flowing into the heater when brought near each other.

CONCEIVES AUTO ACCESSORY

A few weeks ago I submitted a motorized idea for a clothes compartment to a leading automobile manufacturer for consideration. The compartment is designed so that it becomes part of the front seat and permits clothing to be hung up without it becoming wrinkled. The manufacturer informed me that on previous occasions they had seen similar devices and thanked me for the suggestion. What I would like to know is, where do I come in if they use this type of compartment in their product?—Bruce Knoch, Pittsburgh, Pa.

Since the manufacturer stated that the idea was not new to them (evidently having already secured patents on the device) there is little chance of you receiving anything for the idea. According to the United States Patent office the person who files the patent first, unless earlier proof can be furnished, is the rightful owner of the idea. In your case the automobile manufacturer has sole rights to the idea.

RECLAIMING OIL FOR DIESEL USE

I have been told that many power utility companies employ special filters for reclaiming old cylinder oil so that it can be used again to operate diesel engines. I have noticed that old cylinder oil is considerably thinner after being used in a motor, therefore I am somewhat skeptical about the authenticity of this. Is such a reclaimation process really possible?—Joseph J. Walter, St. Joseph, Mo.

Whether or not a reclaimation process such as you mention is really being used we do not know, but it is not at all an impossibility. Properly filtered, so as to remove all grit, the oil could be used for diesel engine fuel. It would have in this used state the same or nearly the same body consistency as regular diesel fuel.

CHARGING BATTERIES ON 32 VOLTS

I have a 32 volt farm lighting plant, but no batteries to go with it. Can this plant be used to charge a 6-volt automobile storage battery and if so, how?—Mrs. John W. Kline, Iowa Falls, Iowa.

A farm light plant provided with the necessary resistance to drop the output to a current suitable for re-charging a 6-volt battery would be possible, but not practical from the standpoint of cost. For recharging a battery in the most economical way we recommend a windcharger plant. This device consists of a salvaged automobile generator geared to a propeller. The propeller revolving in the breeze turns the generator to produce sufficient current for charging a storage battery. Plans for building a windcharger plant are available from MM at 50c.

COPING SAW PLAYGROUND PROJECTS

Being a recreational supervisor and in search of projects suitable for children to make with hand coping saws I am seeking your assistance. Can you tell me where I can secure patterns for plywood garden decorations and similar projects that will not be too difficult for them to make?—Miss Selma Boyer, Ray, North Dakota.

An article on simple woodworking projects for the young folks appeared in the December issue of Modern Mechanix under the title, "Simple Gift Projects For Junior Craftsmen." This article described the making of Chessmen, Hors D'Oeuvres and other novelties of a similar nature. Addresses of firms supplying patterns for lawn decorations will be mailed upon receipt of a stamped-addressed envelope.

ALUMINUM FOR CASTINGS

Is aluminum suitable for home metal casting? I have several articles which I would like to cast in this metal, but would first like to know its melting point and its adaptability to this use?—Edgar Chaisson, Berlin, New Hampshire.

Aluminum melts at 1300 degrees F. If you have access to a small metal furnace operating on city gas you can easily use aluminum for casting metal articles. If you have never before done any casting we suggest that you read the article, "Metal Casting In Aluminum and Bronze," which appeared in the December issue of Modern Mechanix for valuable information on the subject.

(Editor's Note: Your questions will be answered personally and free of charge by MM experts provided they do not require special research or involve trade secrets. Names and addresses of manufacturers of new products described in this issue can also be obtained free upon request. Enclose a self-addressed and stamped envelope for reply. Address: Problems Editor, Modern Mechanix Publishing Co., Greenwich, Conn.)

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2 - *Will I like the work?*

3 - *Can I learn Drafting readily?*

2 Beginning Lessons in Drafting Free

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Drafting welcomes ambitious men — offers good pay to start, with splendid opportunities for promotion. One of the *steadiest* of all lines. Right from the start, the beginner works side by side with experienced men—inking in their drawings, making tracings, constantly profiting by his contact with seasoned engineers. The "higher ups" see his work. If it is good, advancement is sure and steady.

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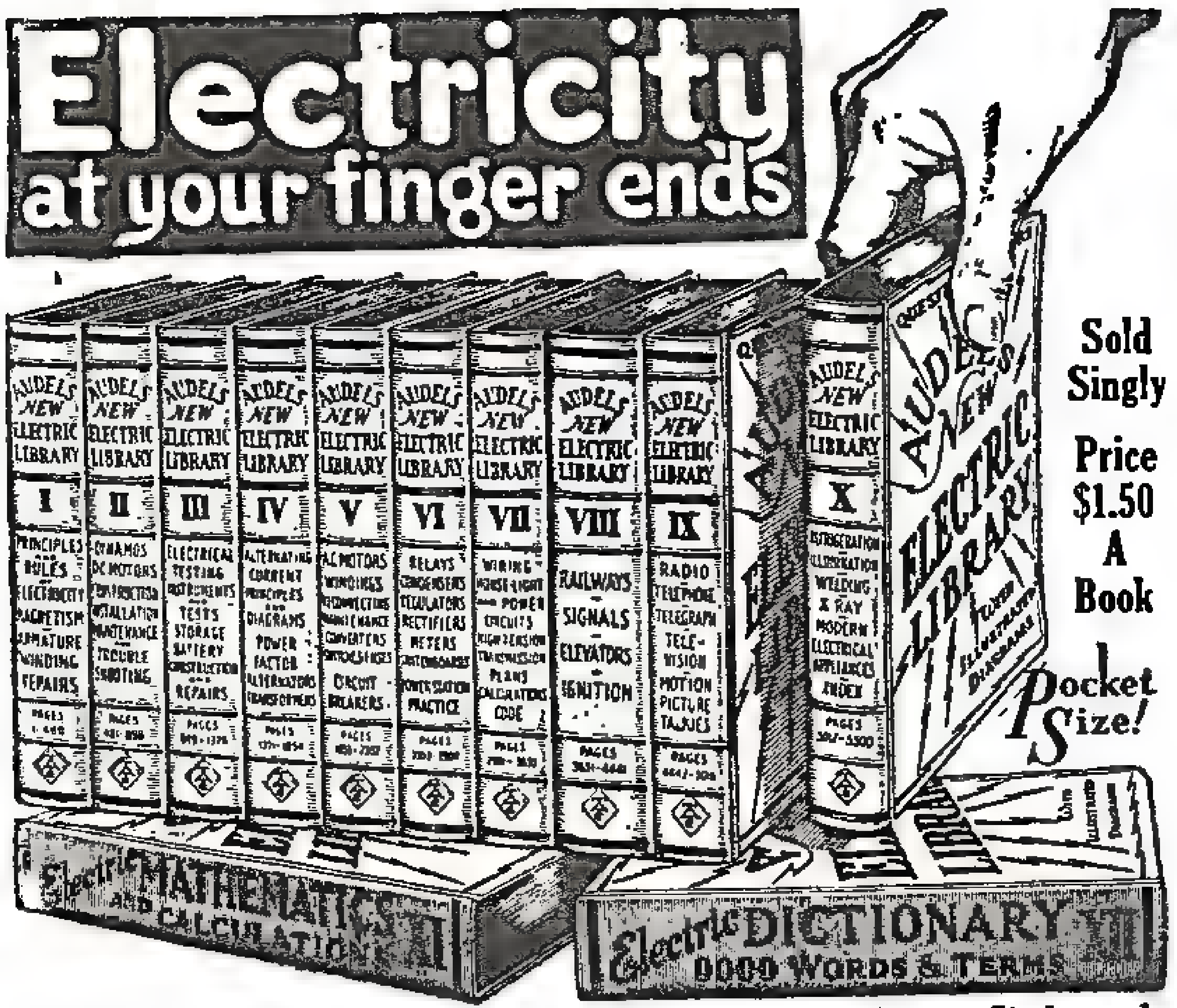
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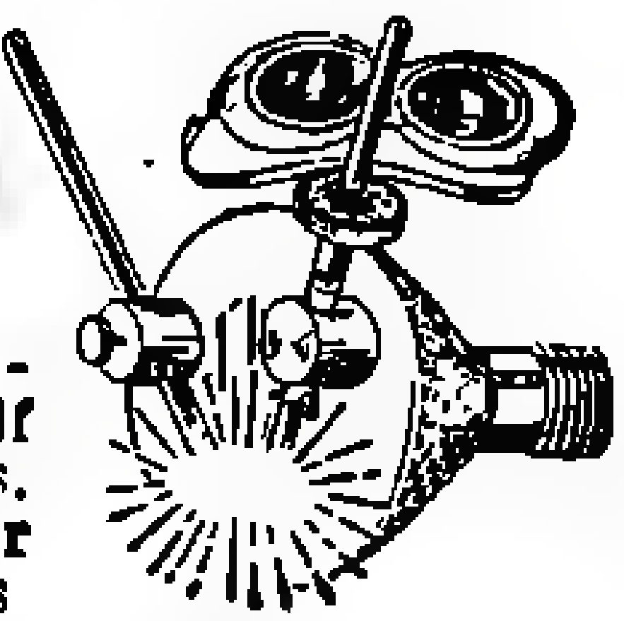

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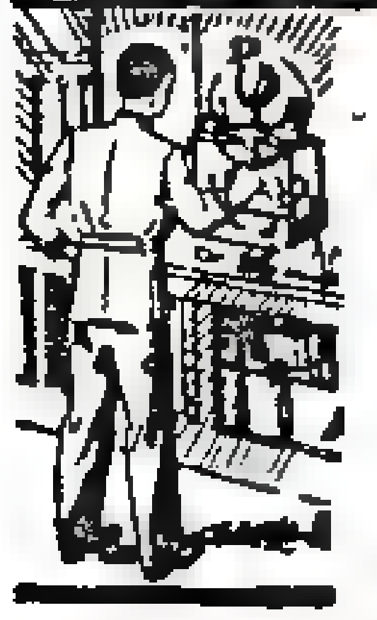

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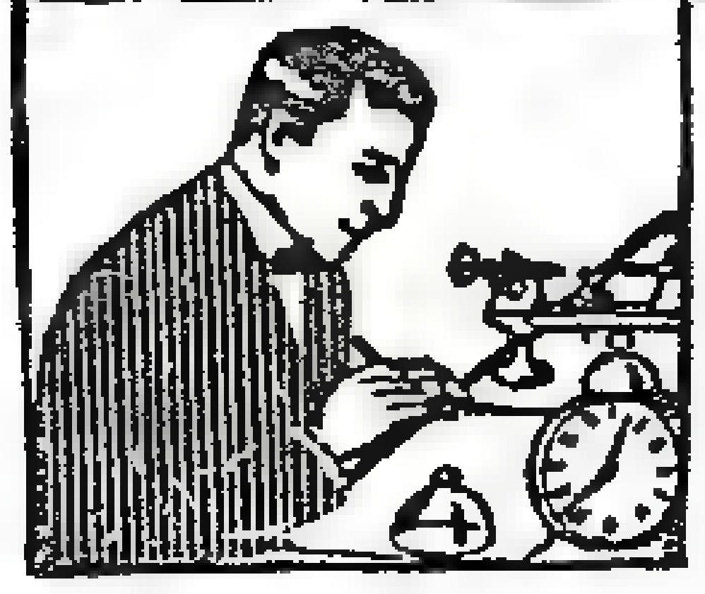

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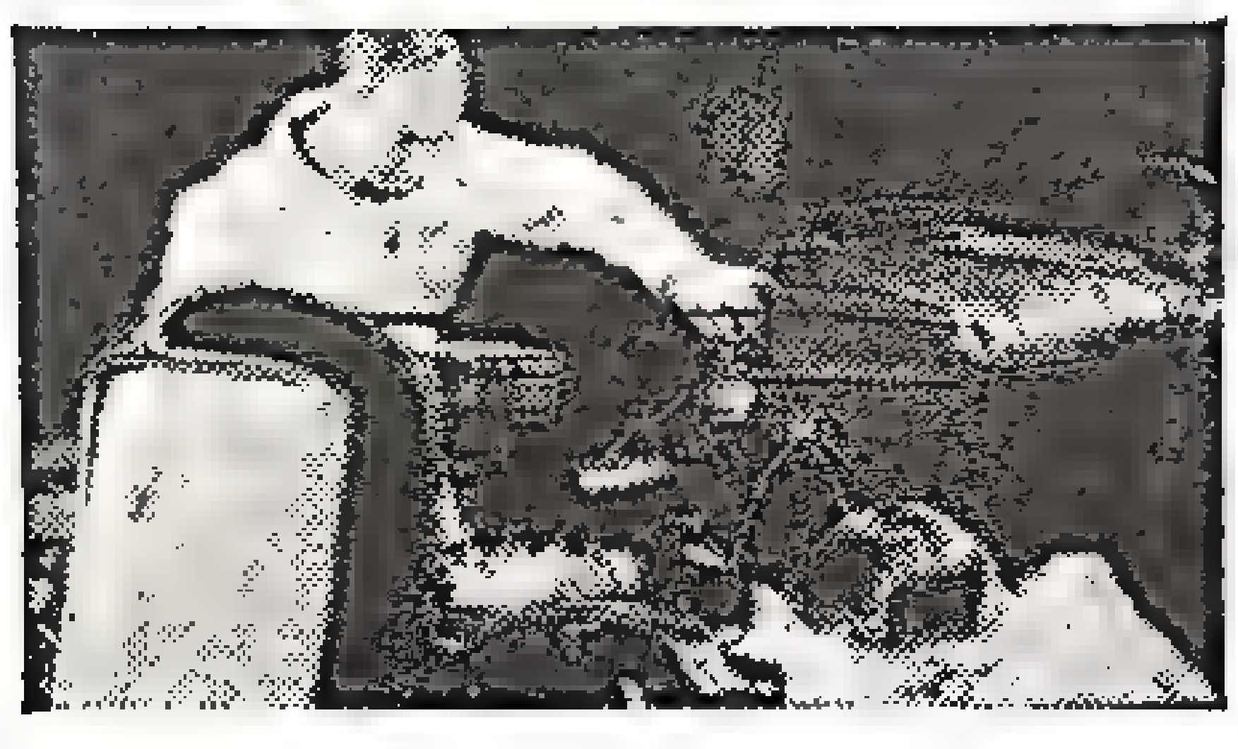

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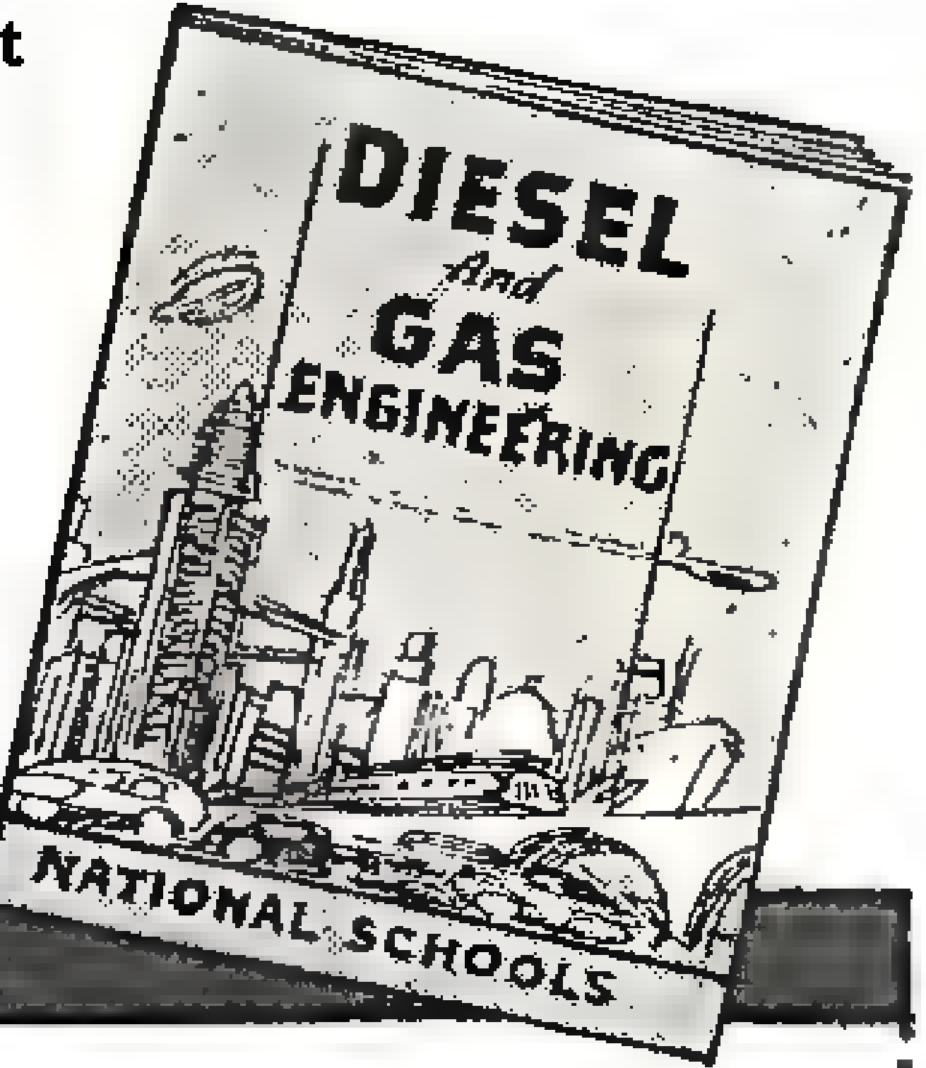

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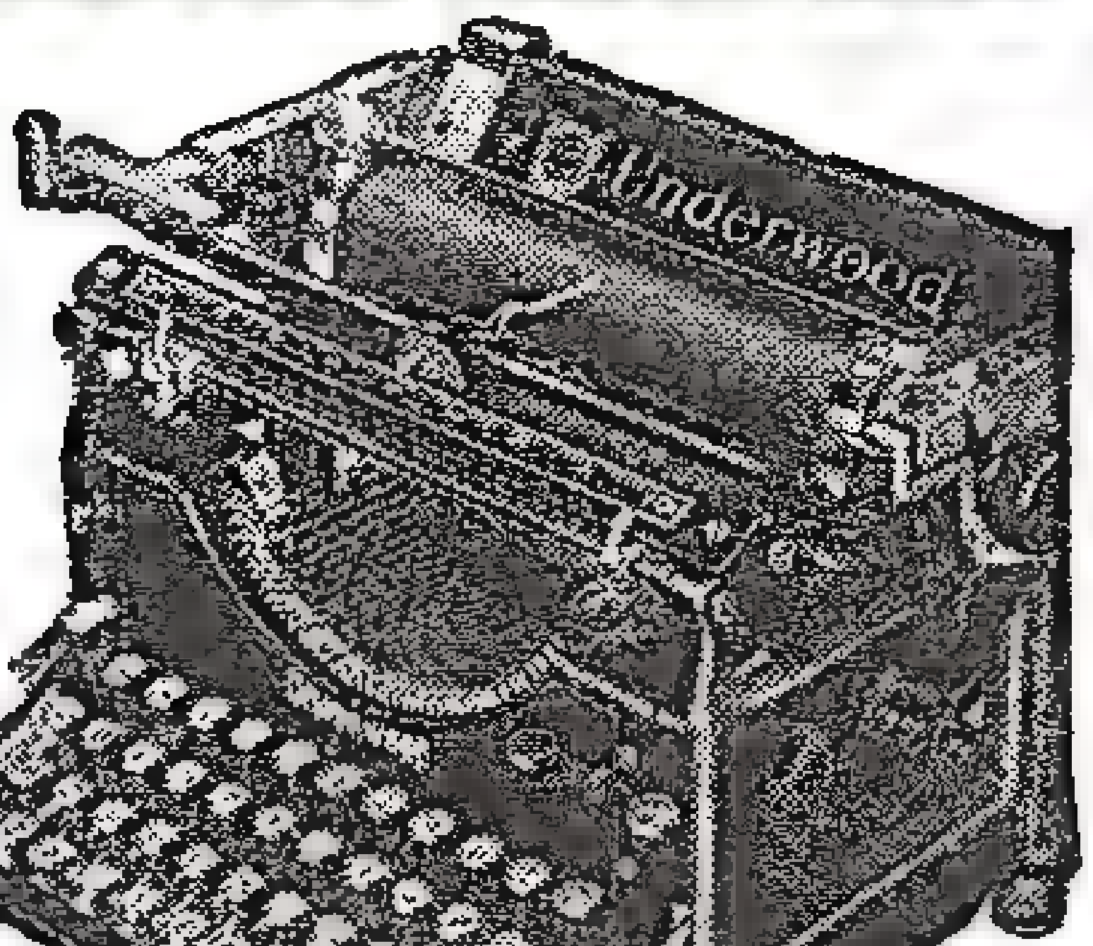

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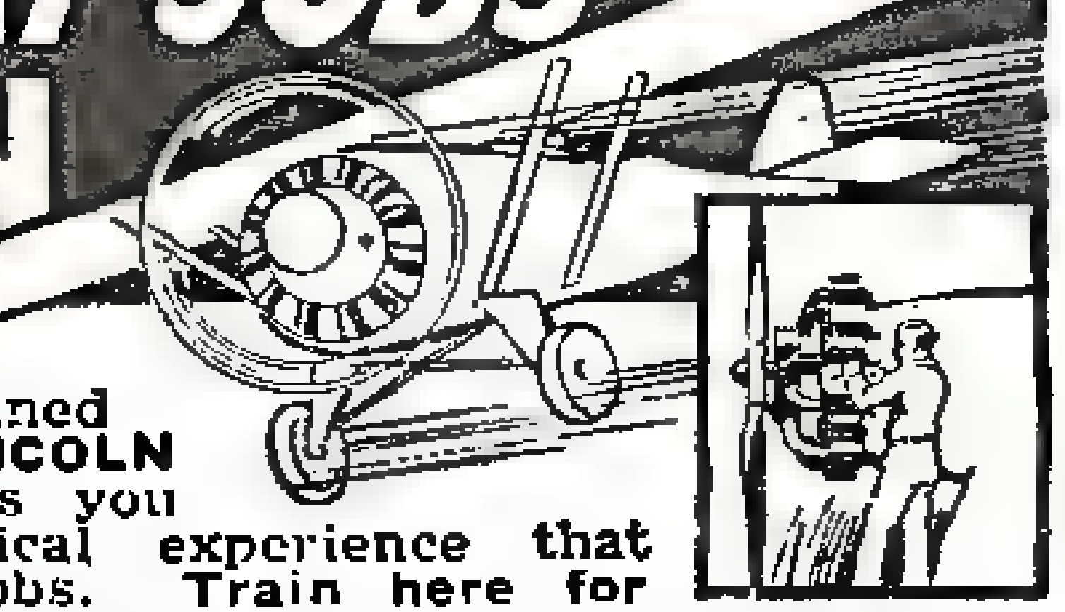

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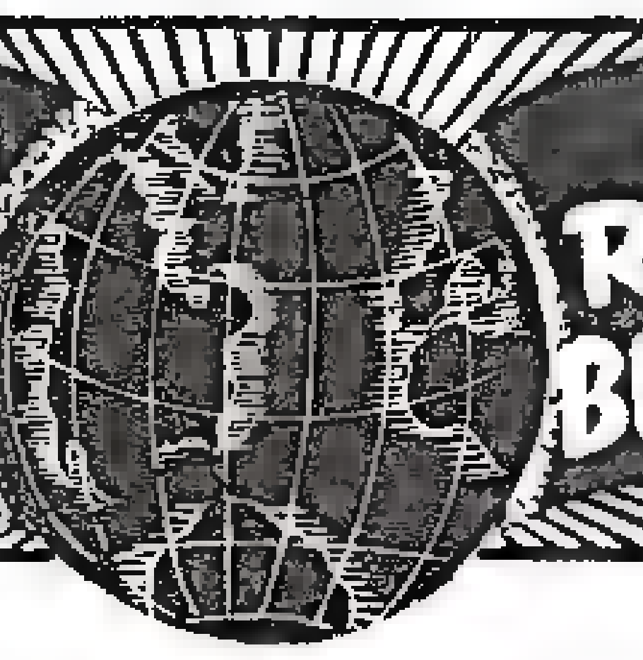

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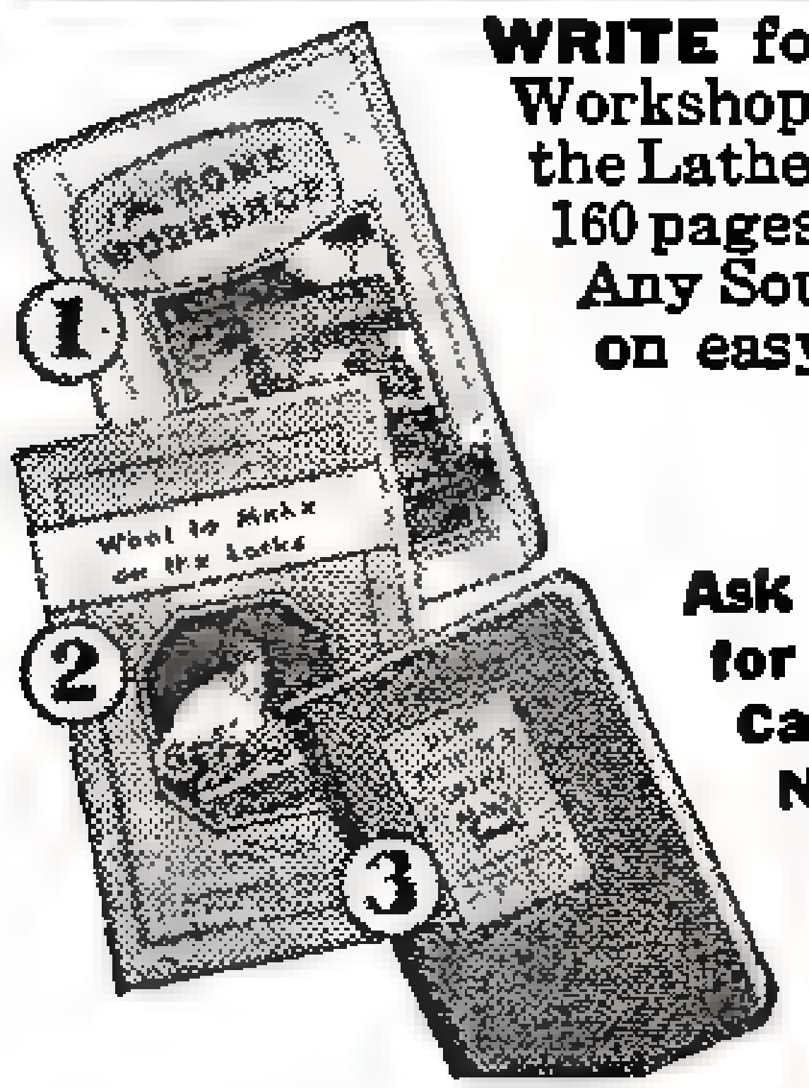
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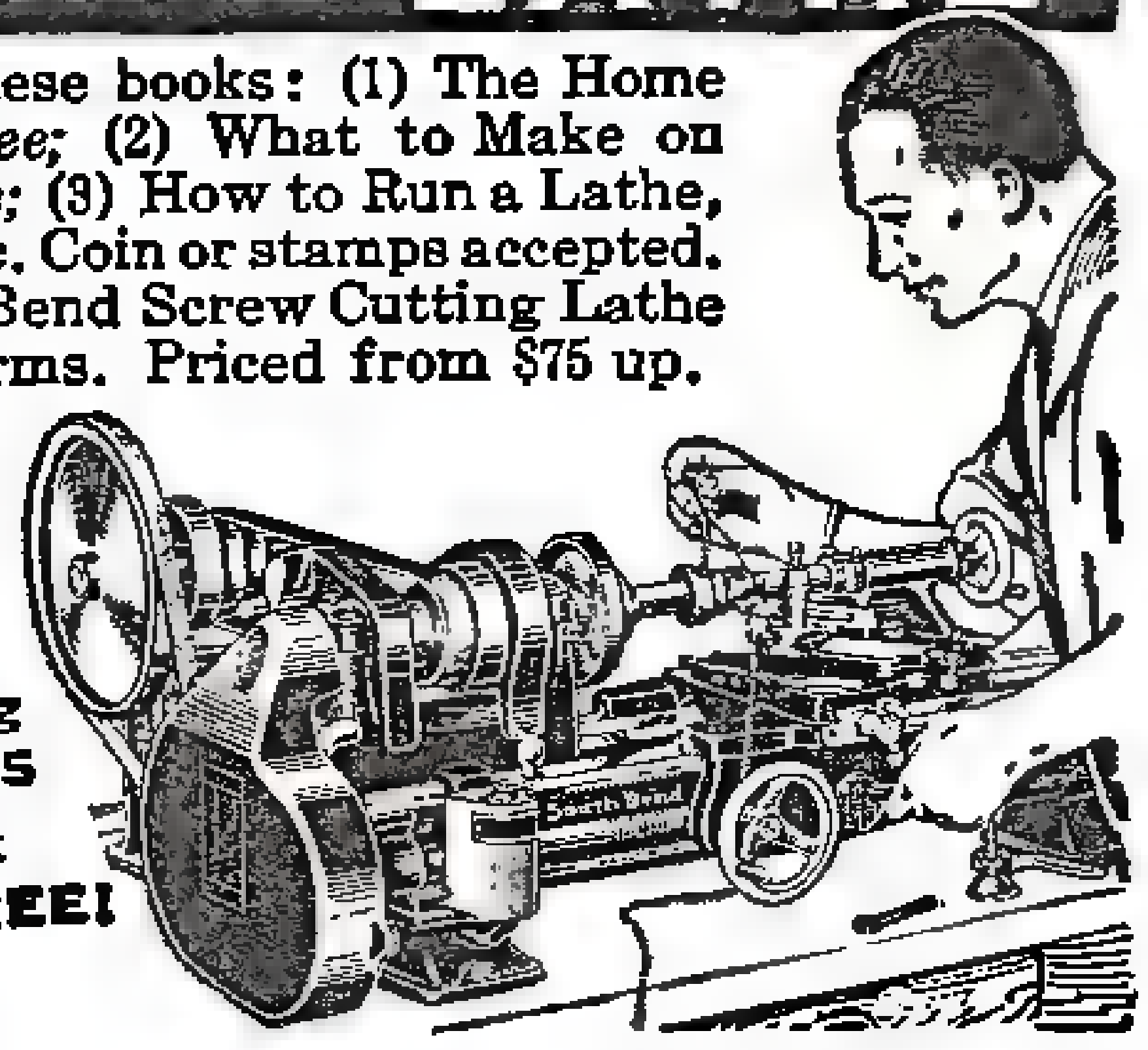

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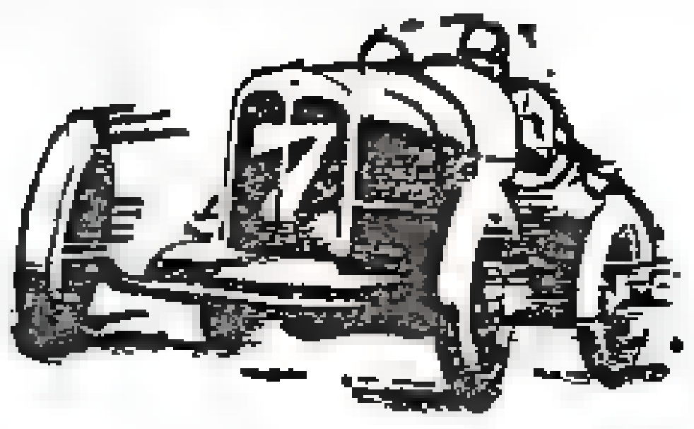

RAYKUNS, Dept. A-1, Cincinnati, Ohio

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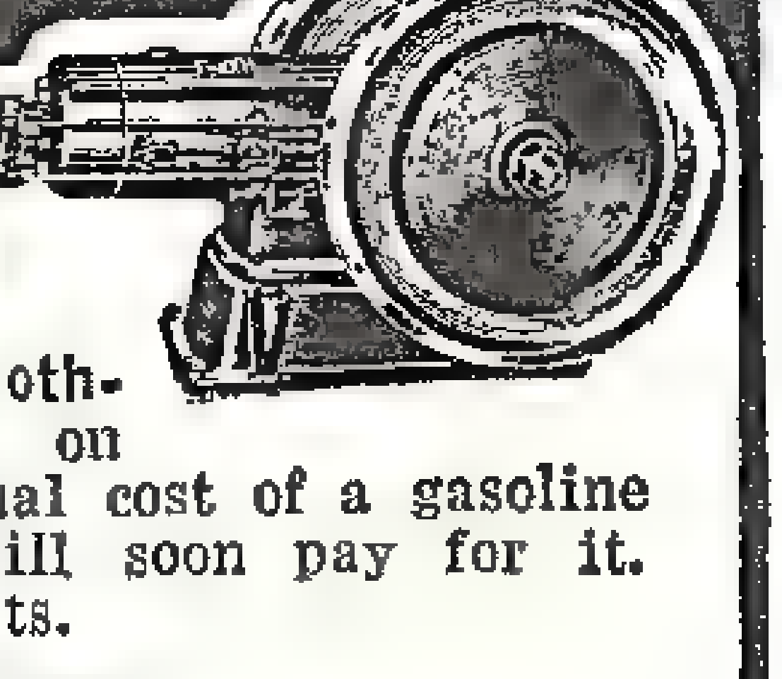

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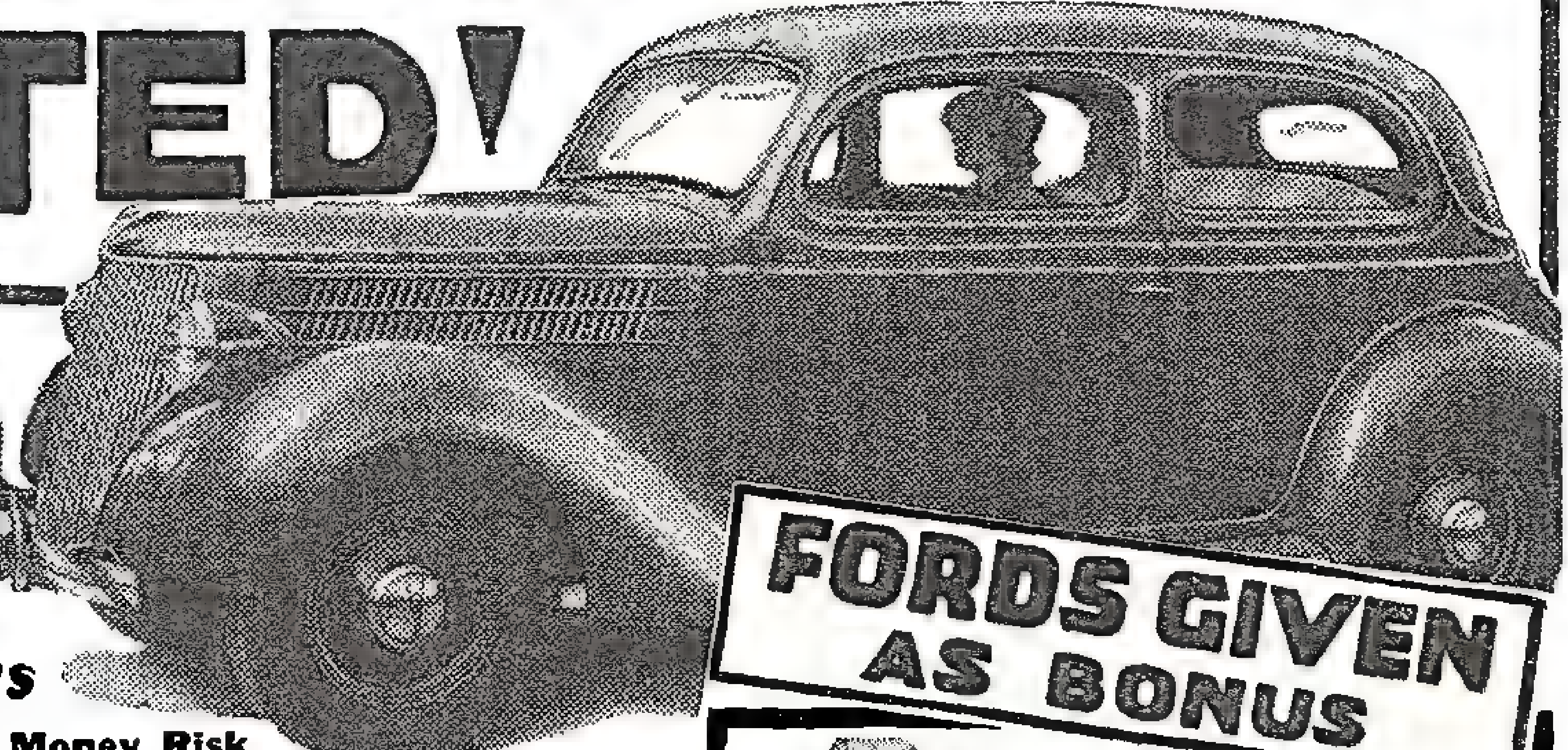

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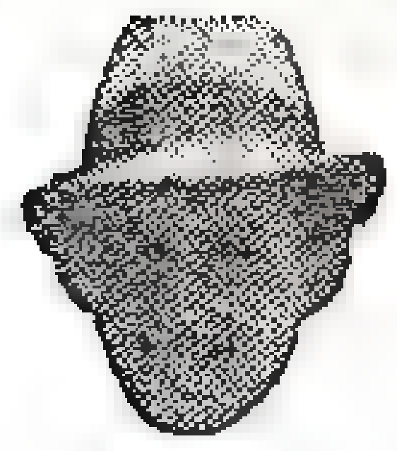

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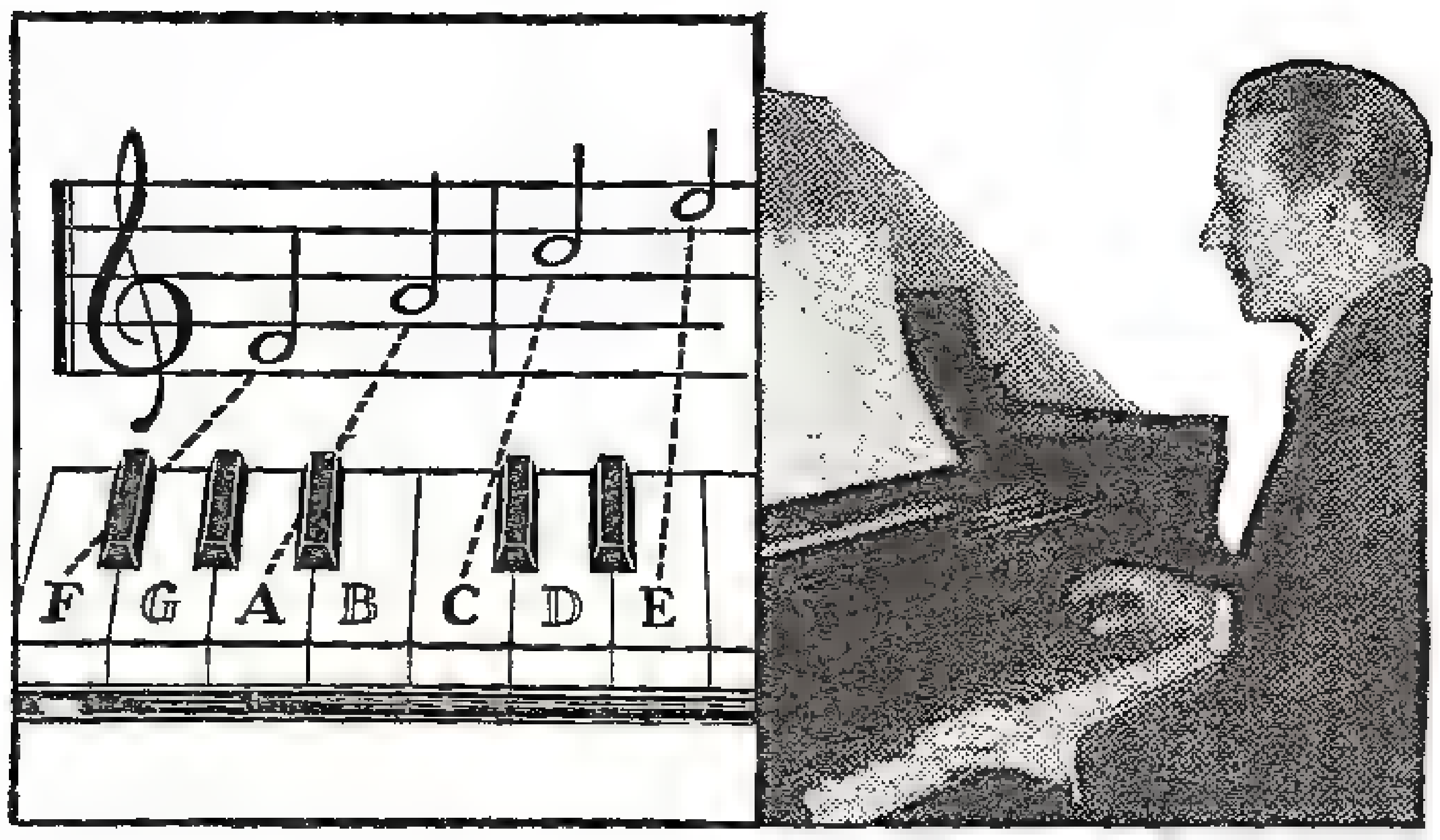

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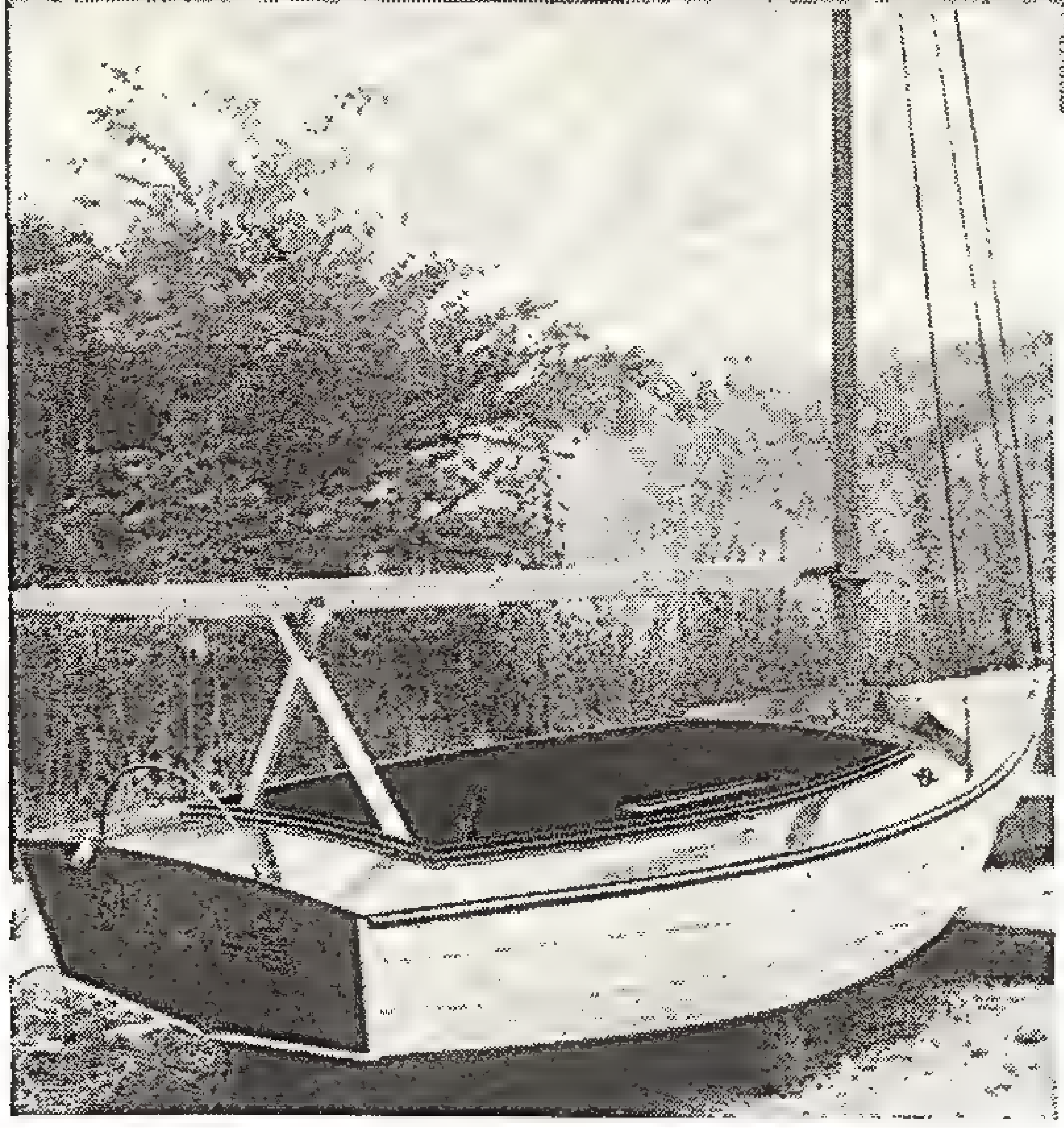


Top—A. D. Pittenger, of Los Angeles, Calif., takes a friend for a sail in NOMAD, a boat built from MM plans. It carries four people. Bottom—Close-up showing construction.

THE mailbag was pretty heavy this month and letters and photos describing many interesting projects completed by MM readers indicate that home workshops are gaining in popularity. From workshops with limited space and a few good tools to spacious shops equipped with lathes, many tools, and other mechanical aids, MM readers are turning out projects of every type and description. Most of them are built from plans that appeared in past issues of MM publications.

***

Talking about making things, don't overlook the new 1937 edition of the MM Handy Man's Home Manual that is now on sale at your local newsstand at 50 cents per copy. If your newsdealer has run out of copies, order one direct from MM at Greenwich, Conn.

Presenting many practical kinks, plans, and detailed instructions for many projects, the manual will be a welcome addition to the library of any workshop fan. Its 144 pages feature over 800 illustrations.

***

First prize of $5 cash for the most interesting project photo received this month goes to A. D. Pittenger, of Los Angeles, Calif. He says:

> Los Angeles, Calif.
>
> Dear Editor:
>
> Enclosed are photos of NOMAD which I built in my attic. You can see from the photos that I followed the MM plans very closely, even to the hollow mast and boom, although I changed the cockpit a bit.
>
> She sails nicely and I have had her in a blow so hard that sand was flying on the beach. I have sailed for hours with four aboard and have hit some big waves without shipping any water.
>
> A. D. Pittenger.

Pittenger's boat certainly is a beauty and judging from the close-up of the craft, it entails craftsmanship of which he may well be proud. Good luck, Pittenger.

***

Trailers are becoming more numerous and MM readers are quick to show their skill at constructing them as the following letter proves:

A real home on wheels is this trailer built by Howard R. Goldy, of Camden, N. J. Its four bunks, stove, radio, sink, and other household articles insure comfortable traveling.

the Editor's Workbench

> Camden, N. J.
>
> Dear Editor:
>
> I am sending you a photo of my trailer. It is 12 feet long and has a chassis similar to the one used by Sir Guy Standing in the MM "How To Build It" book.
>
> Inside the trailer are four bunks, stove, refrigerator, closet, sink, and a home-built five tube radio. I have the MM article describing the CRUISEMITE trailer and would like to make my next trailer like it.
>
> Howard R. Goldy.

Mr. Goldy was awarded a prize of $3 for his trailer photo and letter. He certainly has turned out a creditable trailer and we know he will encounter no trouble in building CRUISEMITE.

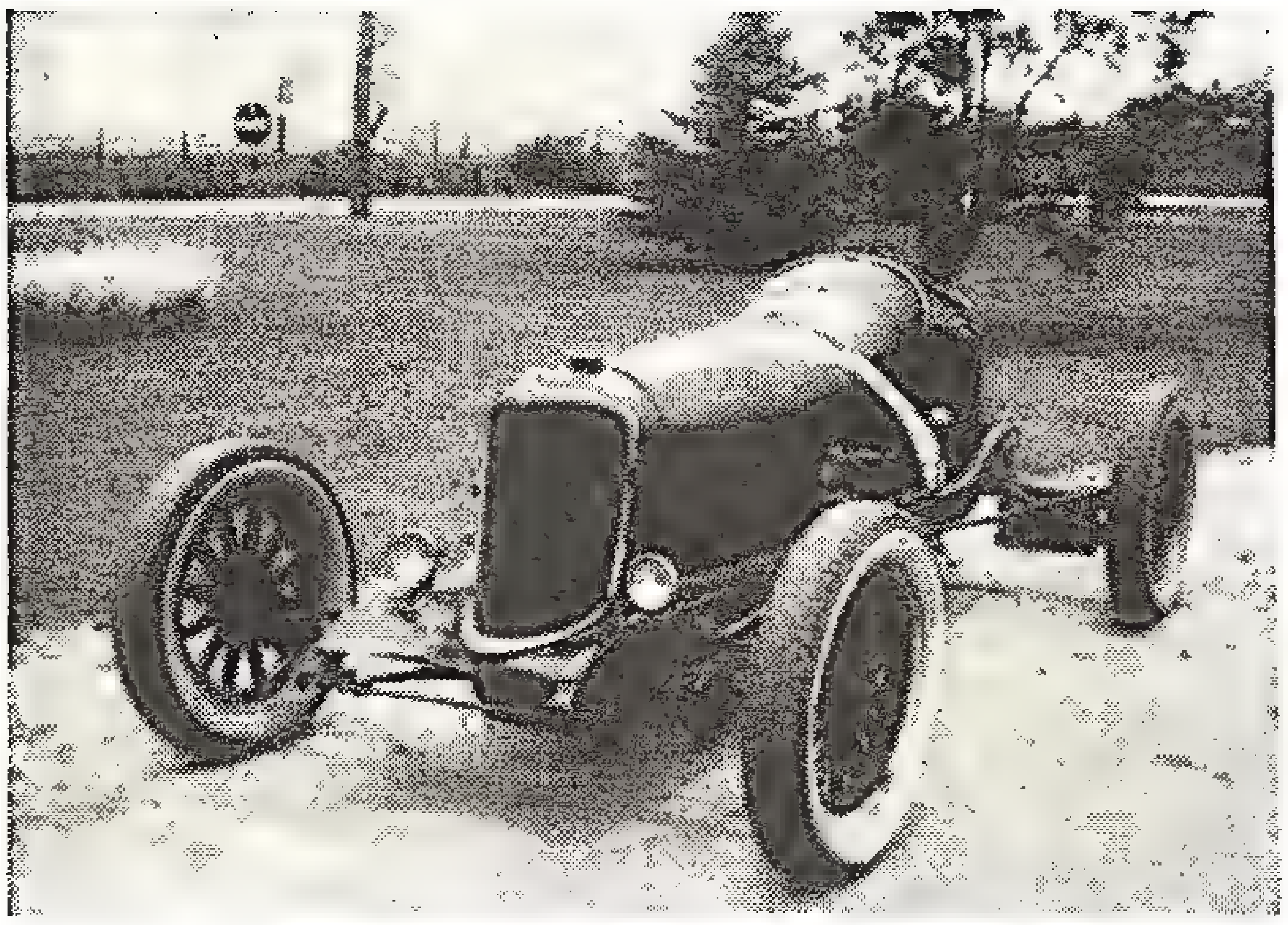
***

Midget cars are still a heavy favorite with MM craftsmen and hardly a mail fails to bring several photos of trim little speedsters. A $3 prize was sent to Homer Groce, of Clemson, S. C., who says:

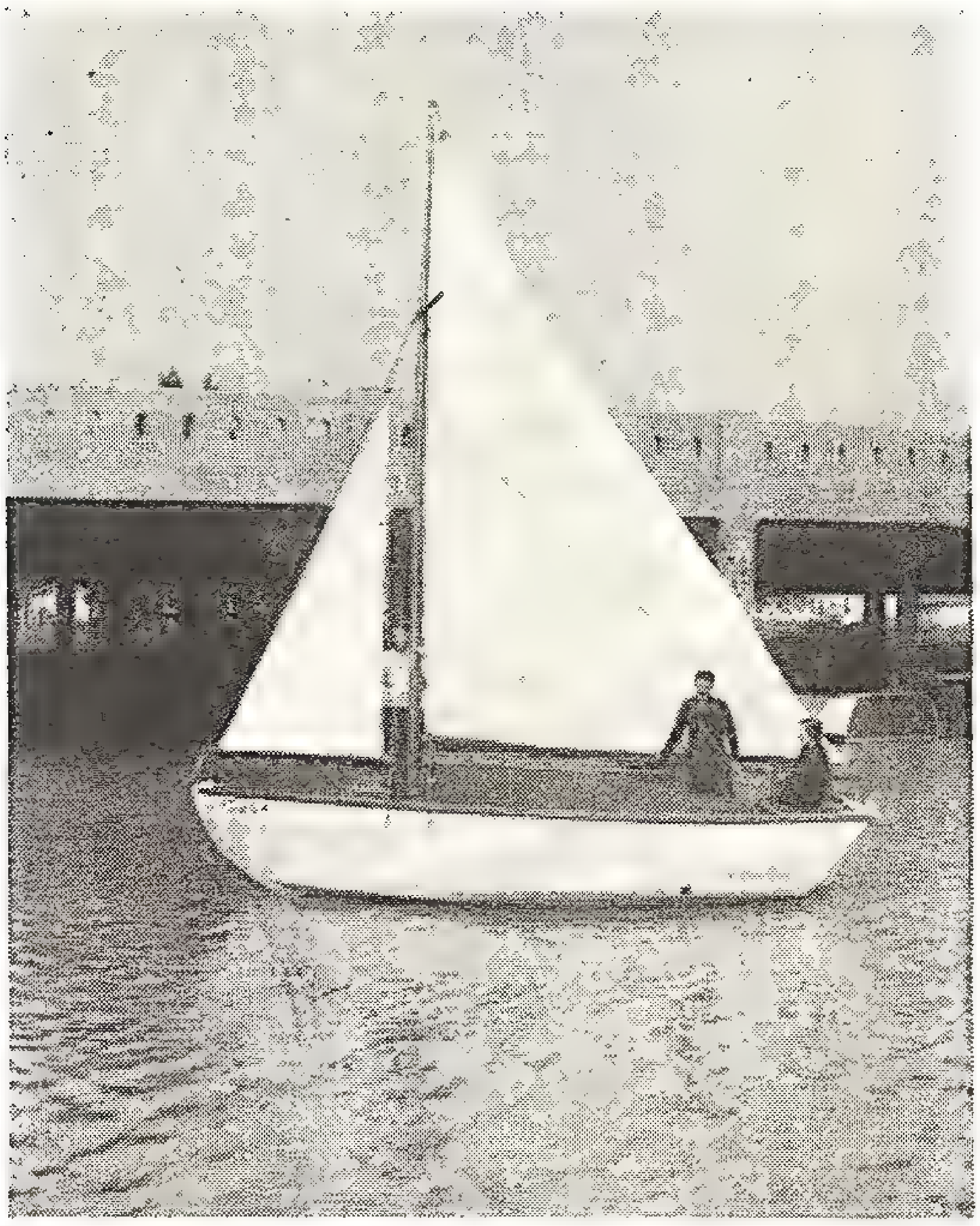
> Clemson, S. C.
>
> Dear Editor:
>
> I am enclosing a photo of a car I built. It has a model A Ford motor hooked up to a model T Ford rear-end.
>
> Cooling is accomplished by two radiators, cut down, and placed one in front of the other. I get 28 miles per gallon with the car and it is capable of doing 80 m.p.h. I will gladly answer any questions from MM readers if they include a stamped, return envelope with their inquiries.
>
> Homer Groce.

Here's a chance to get first hand information about a real snappy looking racer. You can reach Mr. Groce at Clemson College, Clemson, S. C.

***



Featuring a double radiator cooling system, this midget racer attains a speed of 80 m.p.h. and travels 28 miles on a gallon of gasoline. It was built by Homer Groce, of Clemson, S. C.



A pleasant sight to the eyes of boat lovers is this trim looking sailboat built from MM plans. BUDDY, as the boat is known, was built in little over a year by Neil Hoyt, of Detroit, Mich.

Boats and more boats. All good ones, too. No matter how many workshop letters the editor receives, the number of boat letters and photos far outnumbers the others. Our only regret is that we cannot print more of the letters, but space is limited.

From Detroit, Mich., comes a letter and photo that secured a $3 prize for its writer.

> Detroit, Mich.
>
> Dear Editor:
>
> Here is a picture of BUDDY, built from plans in the MM book—"How To Build 20 Boats." I am very proud of her as she is the first boat I ever built. It cost about $250 and required a year and three months to build.
>
> I am putting outside ballast on the keel this winter as I use her on the Great Lakes. I'll be glad to give any information to MM readers who may wish to build BUDDY.
>
> Neil Hoyt.

We sure envy Mr. Hoyt. He'll be able to make some excellent cruises in BUDDY. He has reason to be proud of her for she is a trim craft and pleasing to the eye.

***

Winter weather always spurs the snow-sled fans and they don't forget to send photos to their

[*Continued on page* 26]

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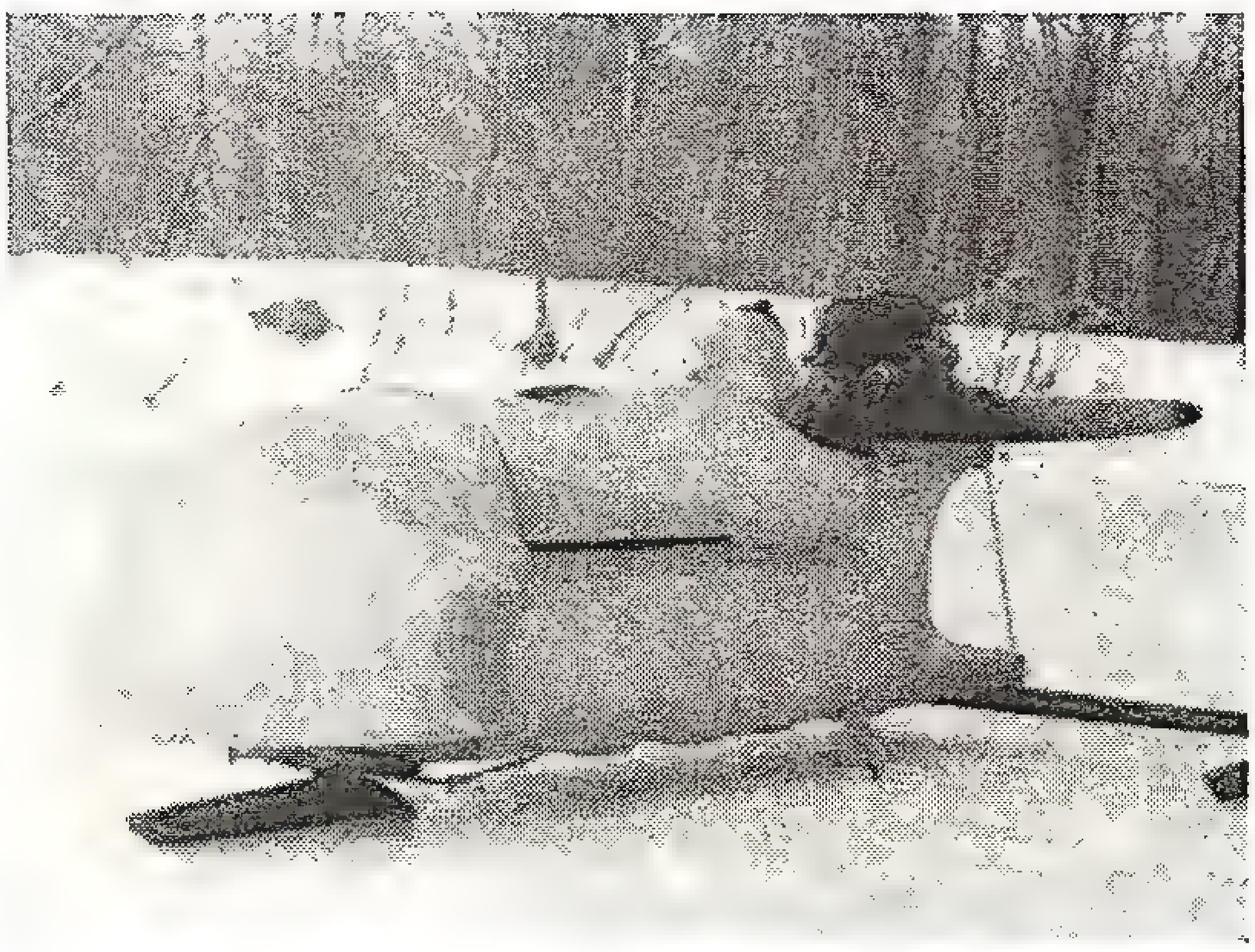
Editor's Workbench Chips

[*Continued from page* 25]



Powered by an old motorcycle engine and a small propeller, this snow-sled slides along at 62 m.p.h. Paul R. Bussler, Williamsport, Pa., built it from wood and sign painter's canvas.

favorite magazine. Here's a letter from an MM reader of long standing:

> Williamsport, Pa.
>
> Dear Editor:
>
> I'm sending the Workbench a photo of a snow-sled we built. It is made of wood except for the motor mount which is made of ¾-inch piping. The body frame is covered with sign canvas doped up with paint. The sled is powered with an old motorcycle engine and averages over 62 m.p.h.
>
> I would like to see some articles on gas-powered airplane models. I have been reading MM for over eight years and must say that there is no better magazine published.
>
> Paul R. Bussler.

Bussler's sled photo won a $3 prize. Send in photos and letters about your completed projects, readers. You may be awarded a prize, too.

The advice in our guest editorial this month is a summary of the advice which Mr. Emile F. du Pont gave originally in an address to the American Chemical Society, Division of Chemical Education, meeting in Pittsburgh. We believe it good advice to any sort of job aspirant.

Chemists have played a large part in the development of E. I. du Pont de Nemours & Co. The founder who started the business in 1902, was a chemist who had been an associate of Lavoisier. Of the firm's present 41,000 approximately 3,000 have had chemical training.

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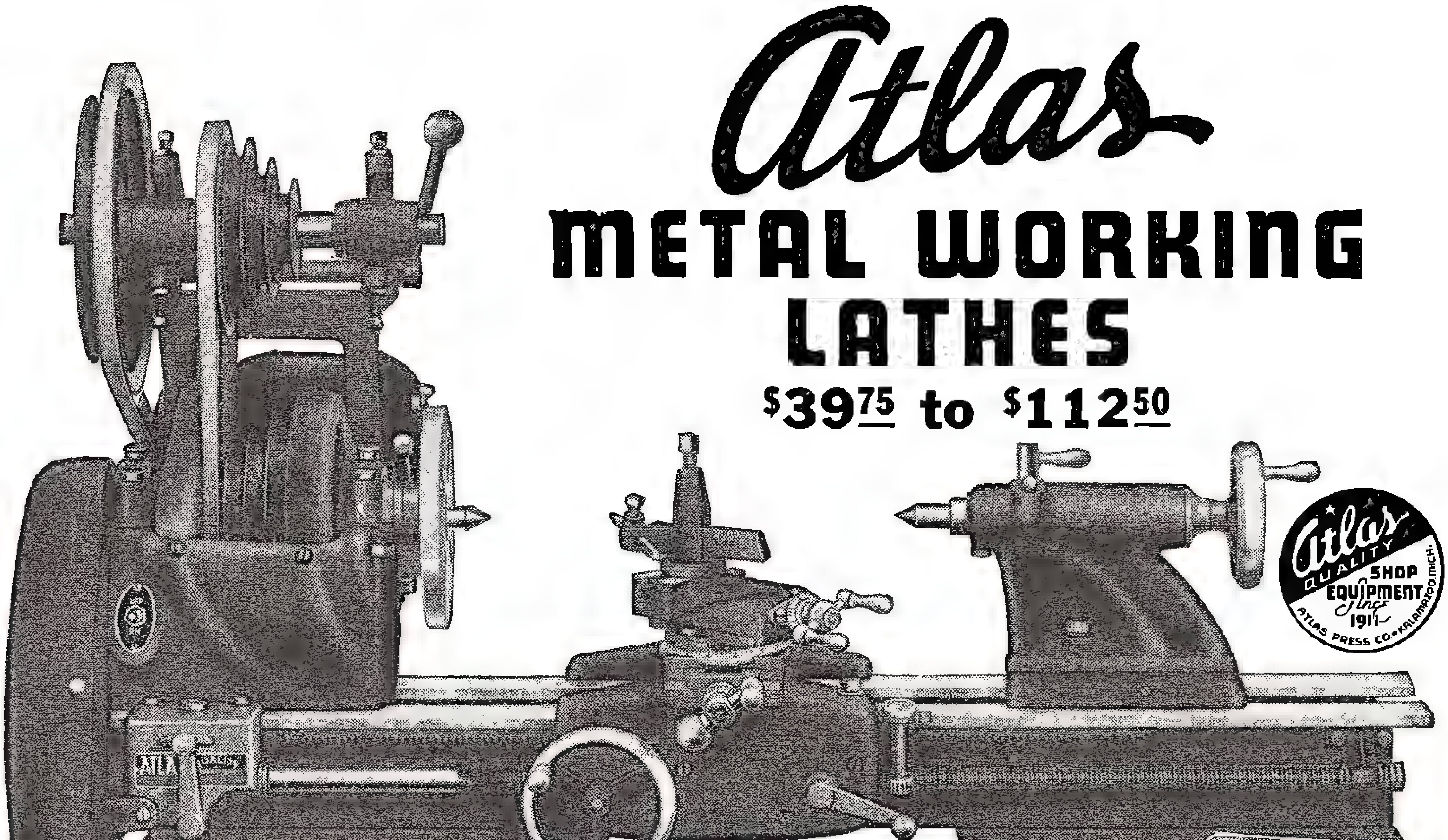
Readers in New England should listen to the Modern Mechanix Sunday radio programs over the Yankee network. Eight stations of the network and WINS, New York City, broadcast the program at Noon. It is repeated from WTIC, Hartford, Conn., at 1 p. m.



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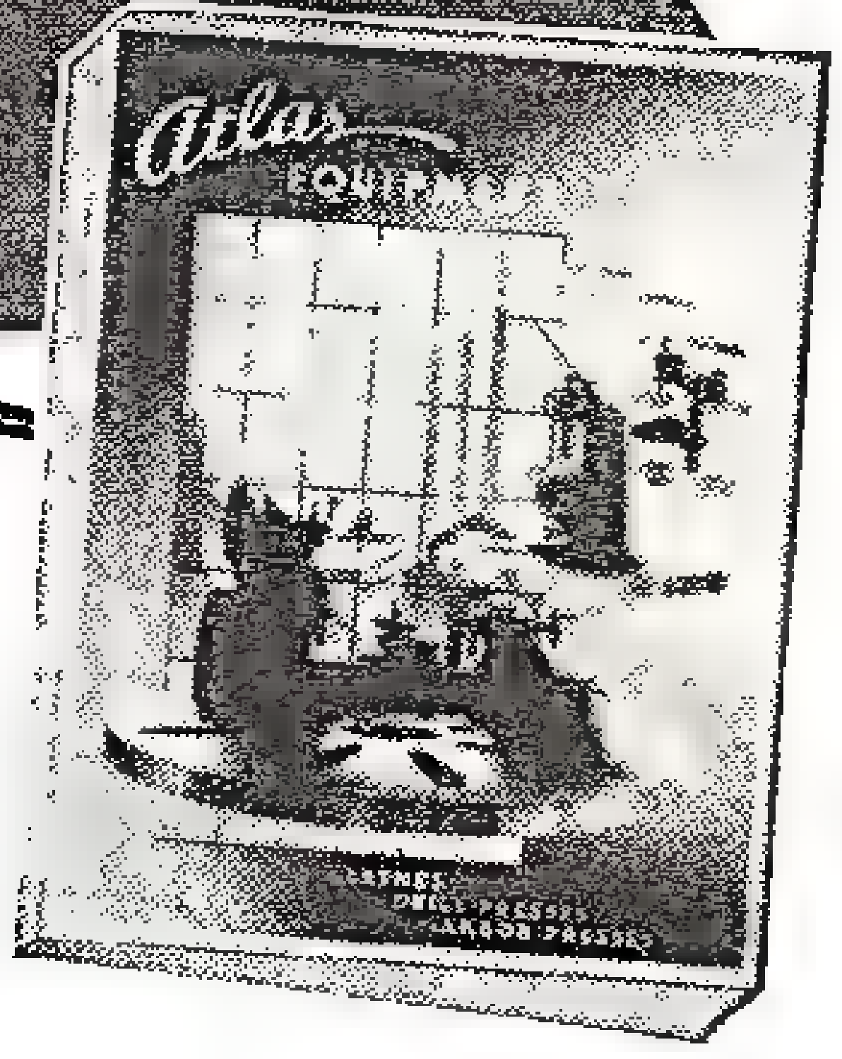

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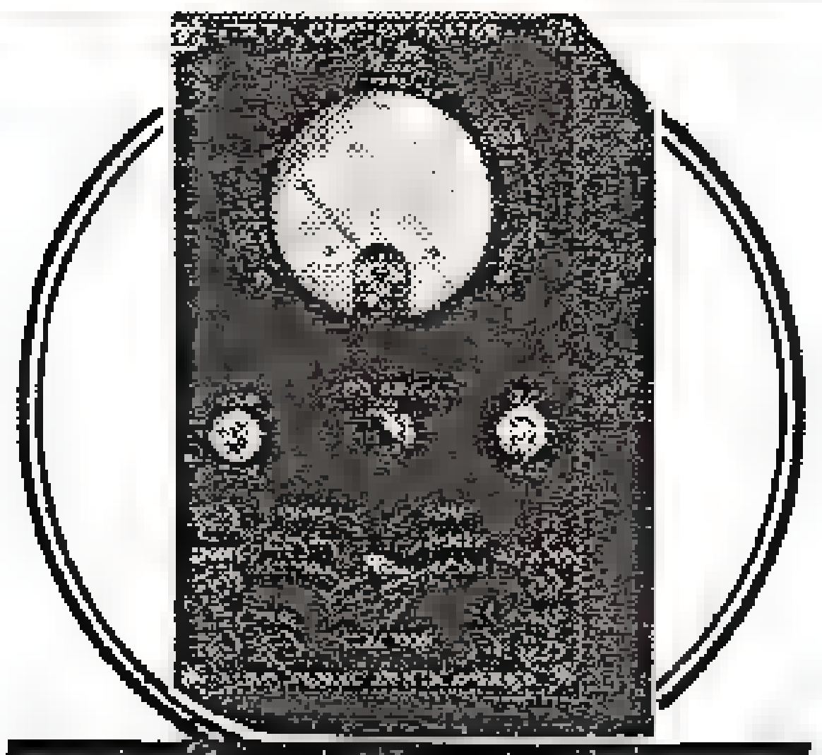

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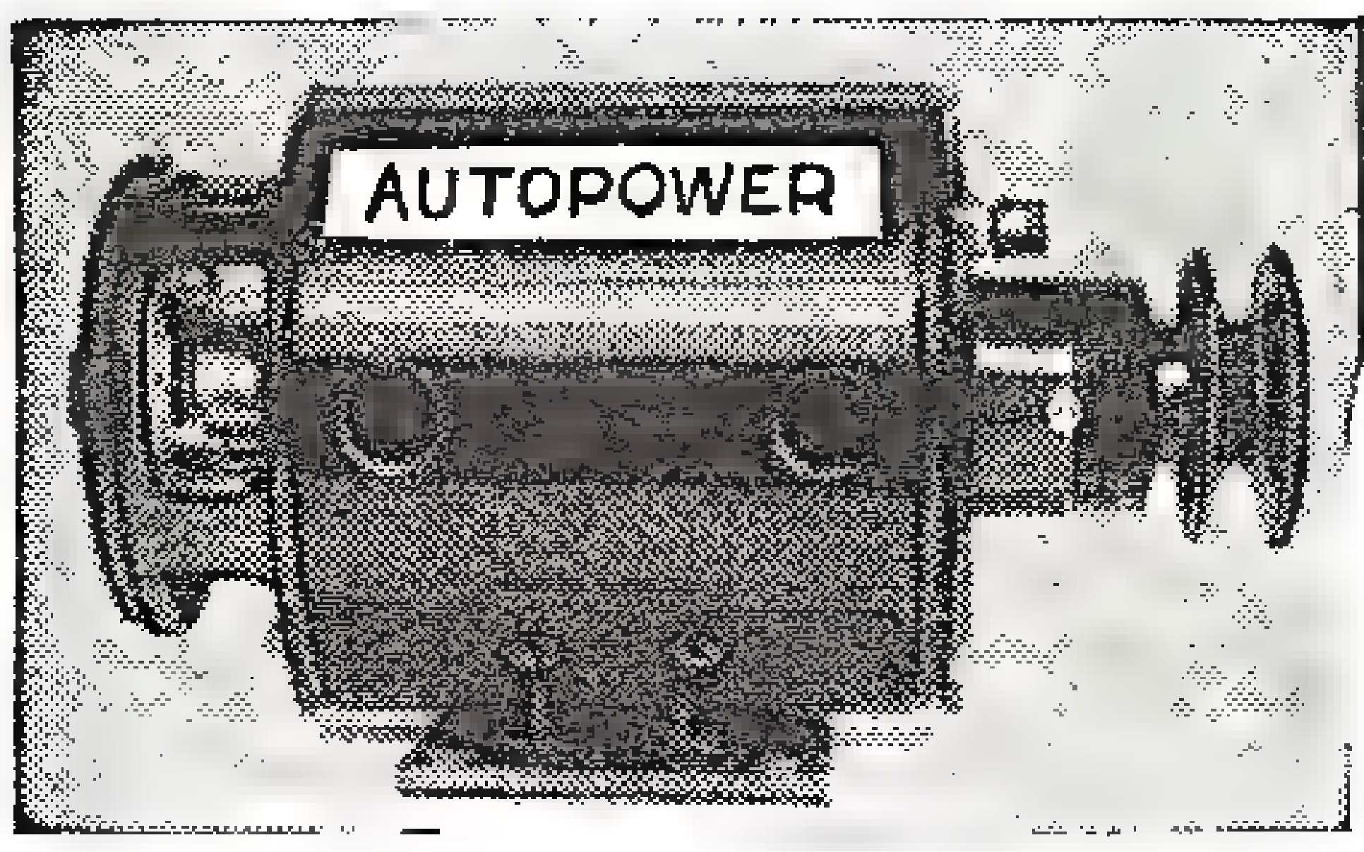

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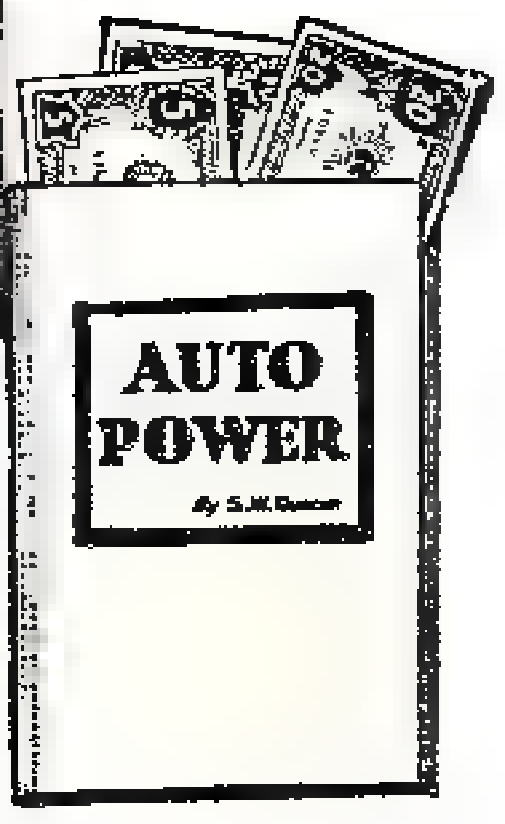

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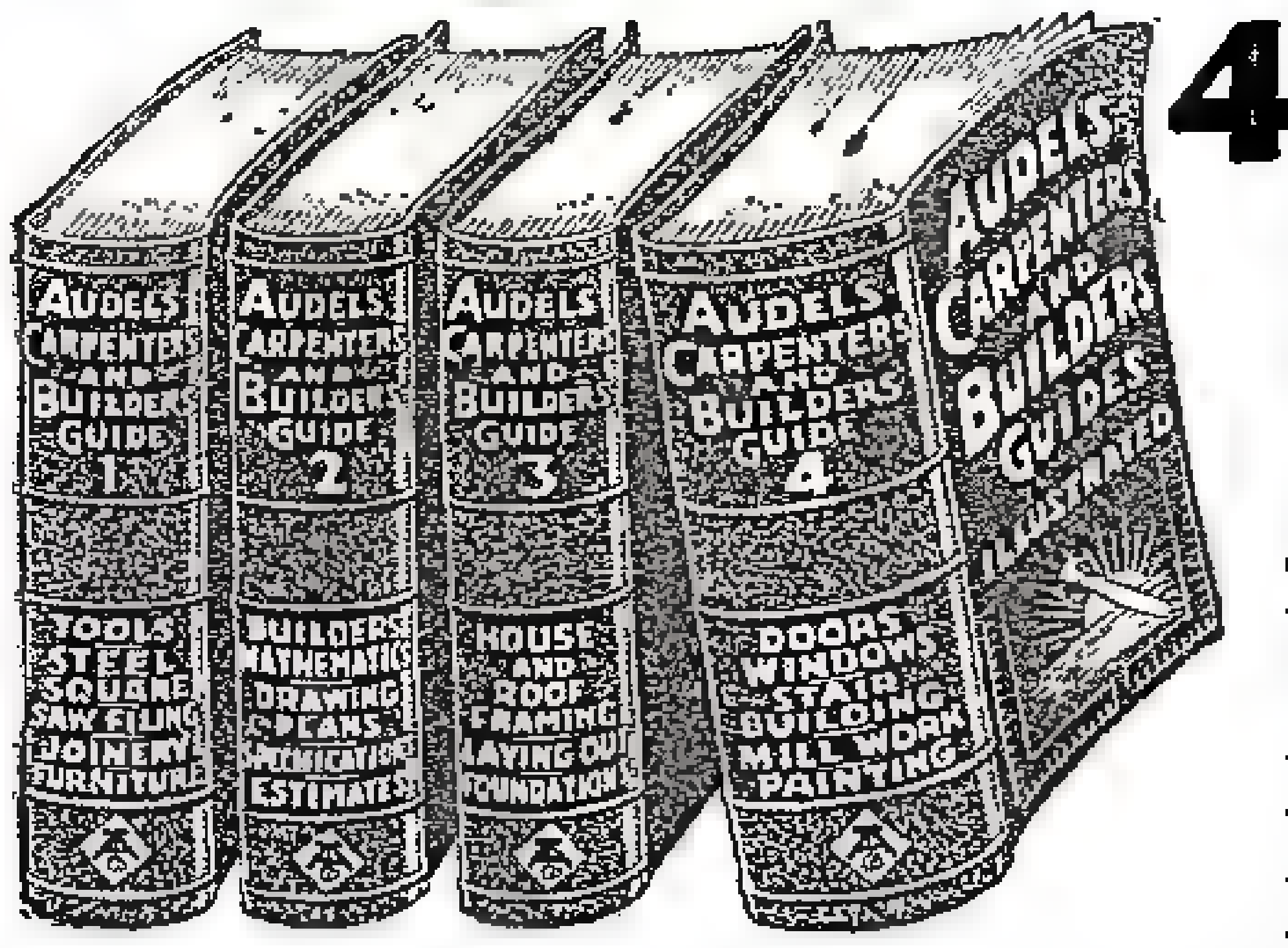
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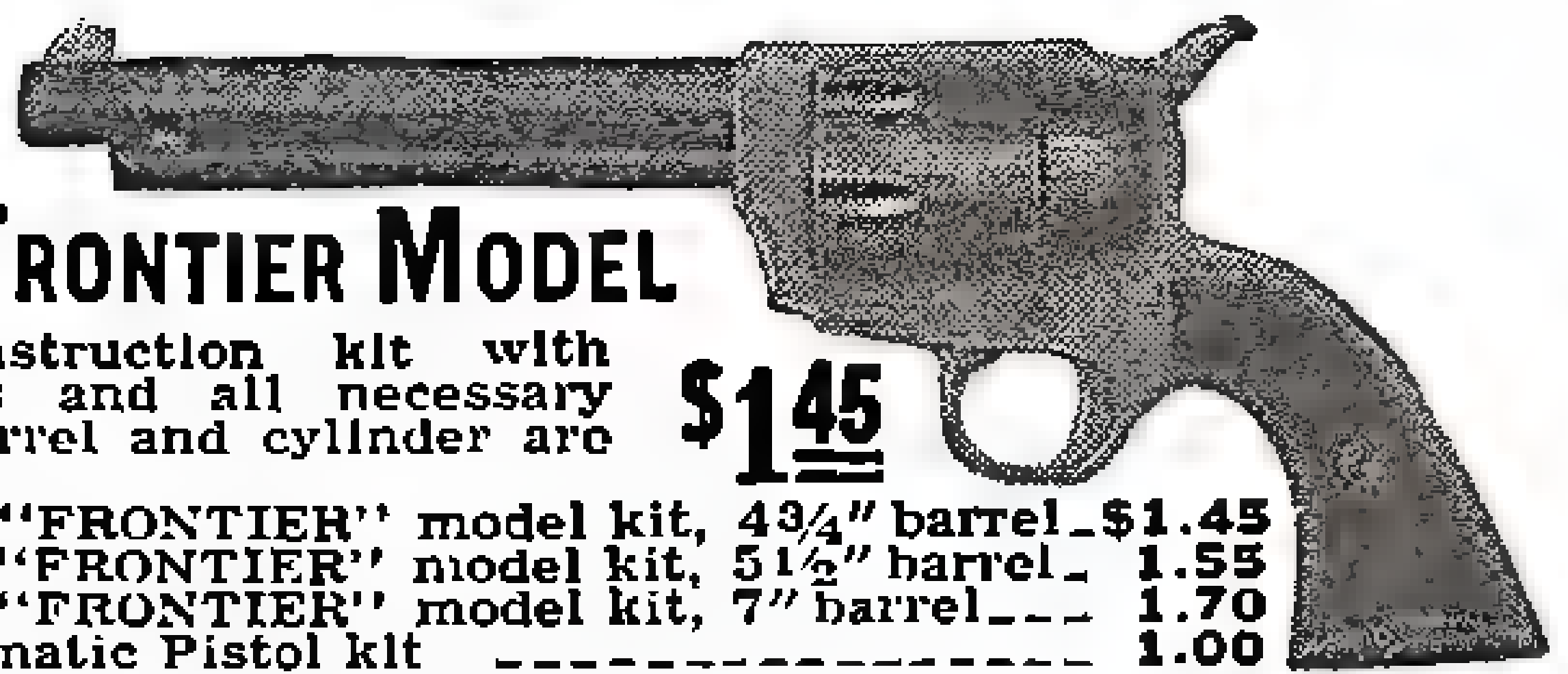

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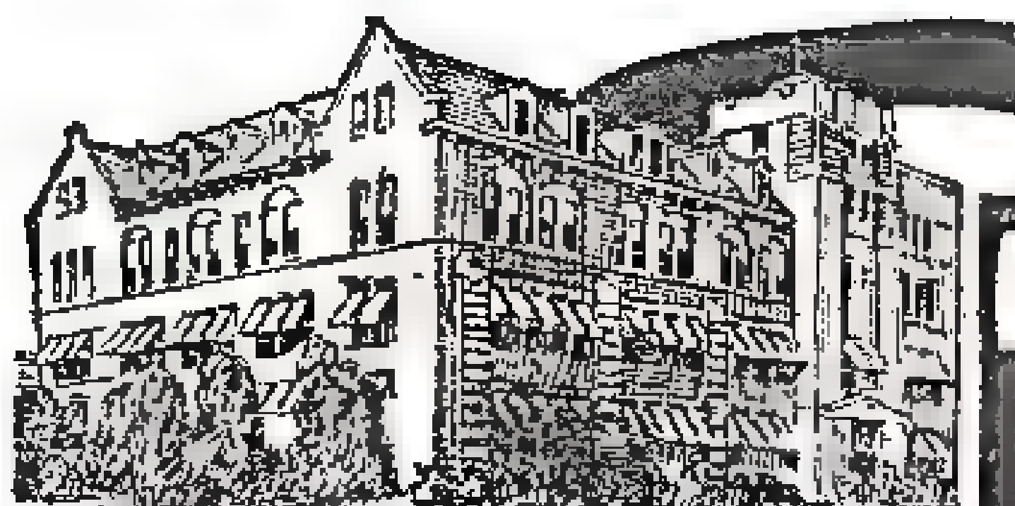

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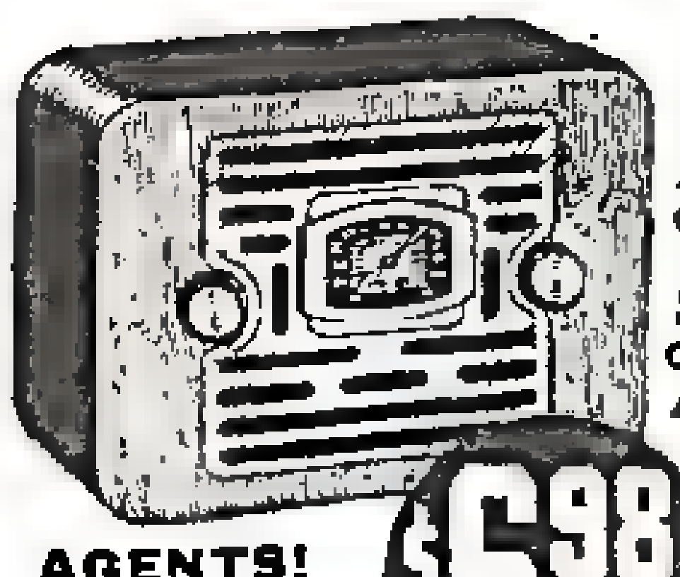

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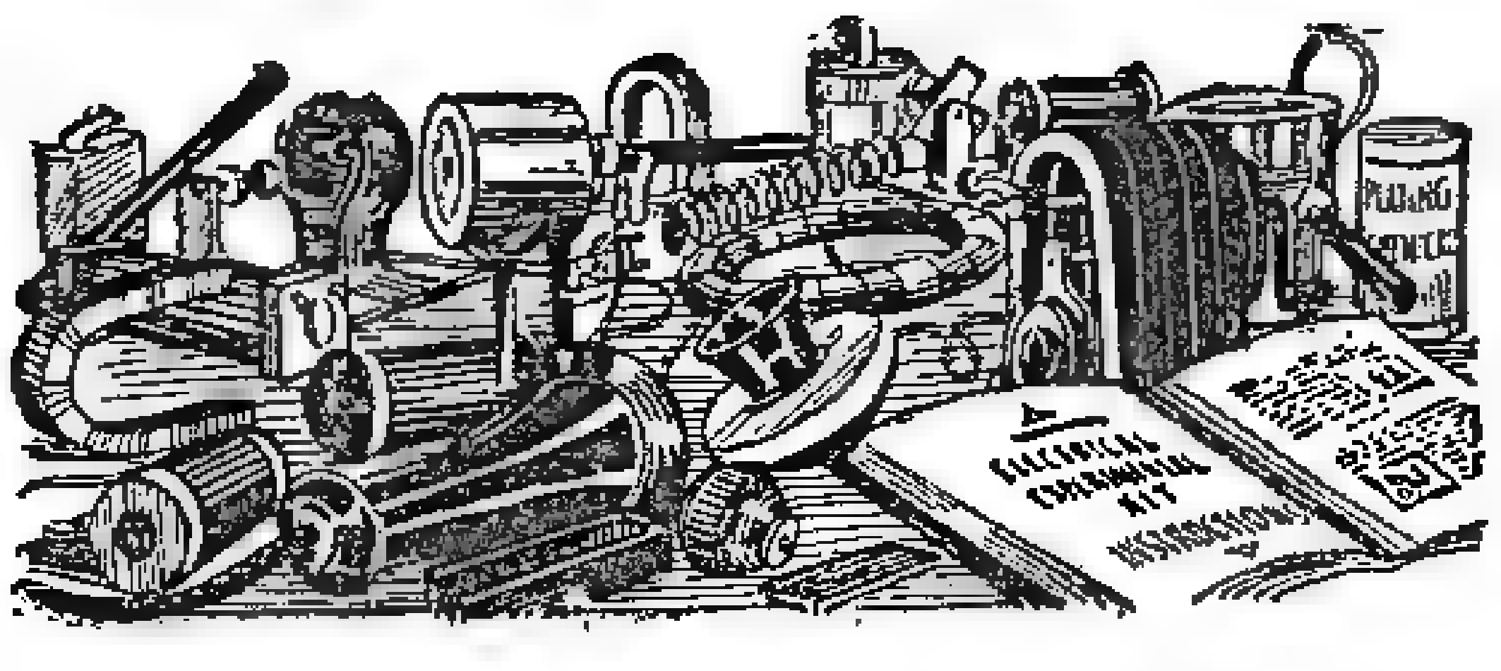

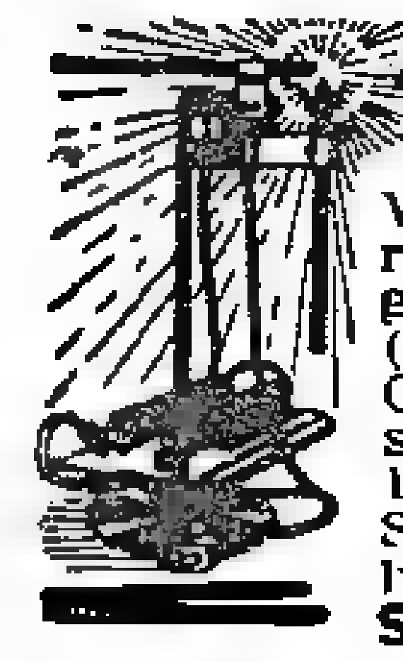

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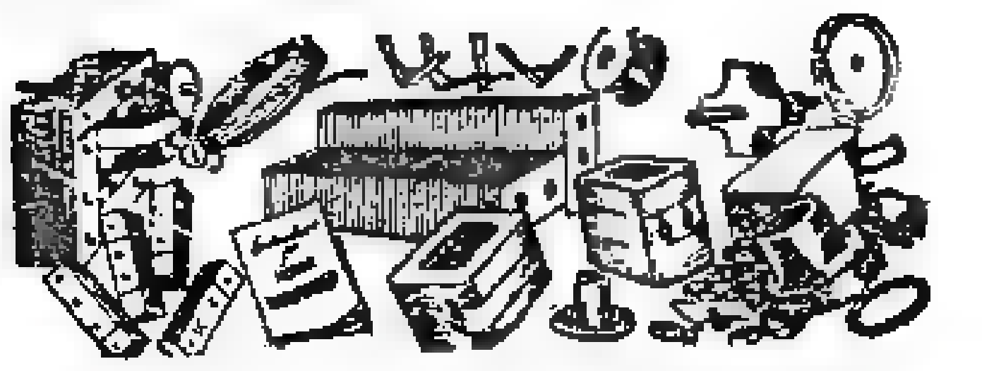

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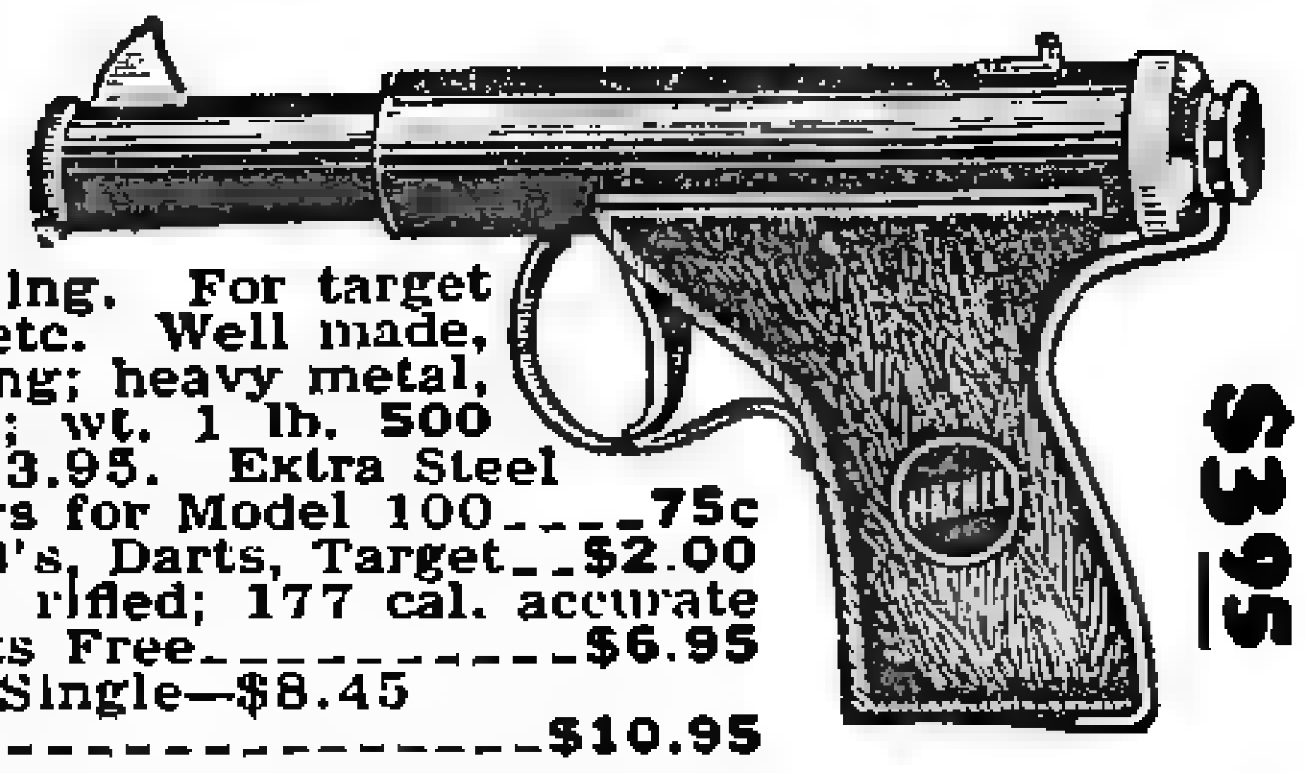

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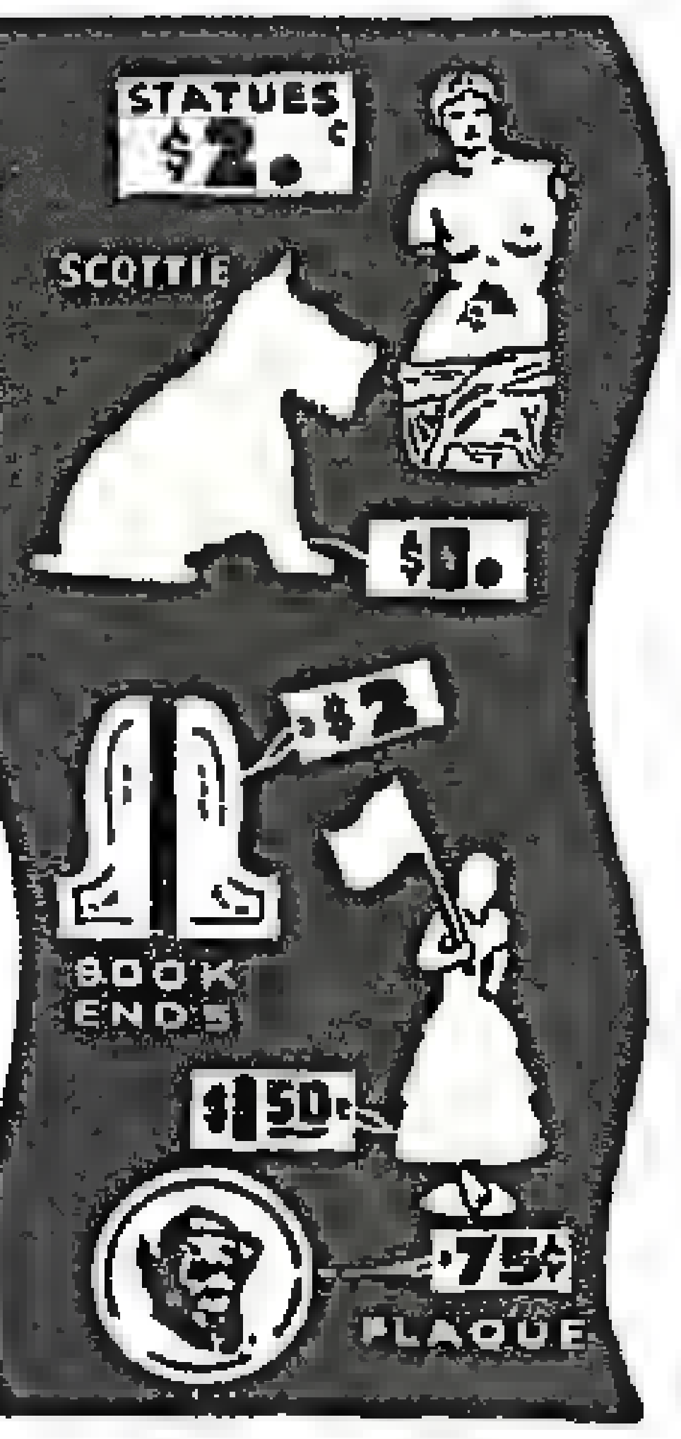

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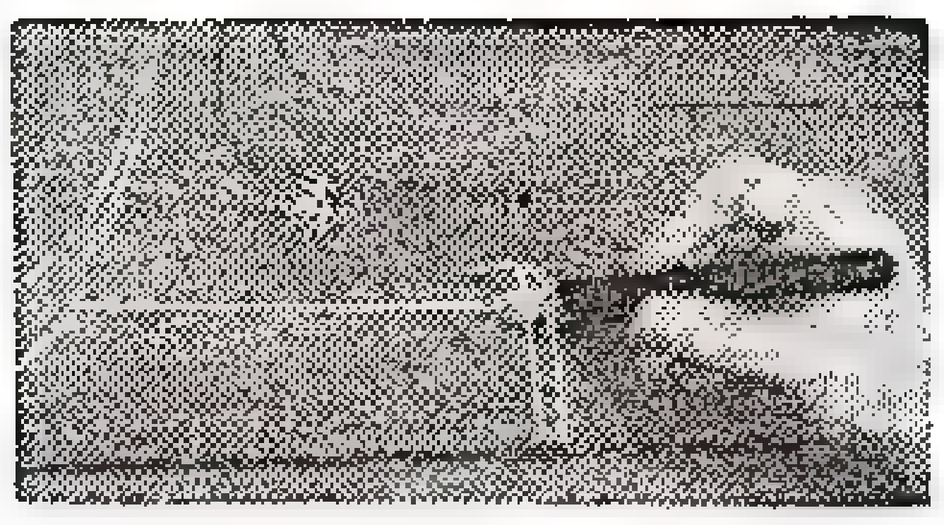

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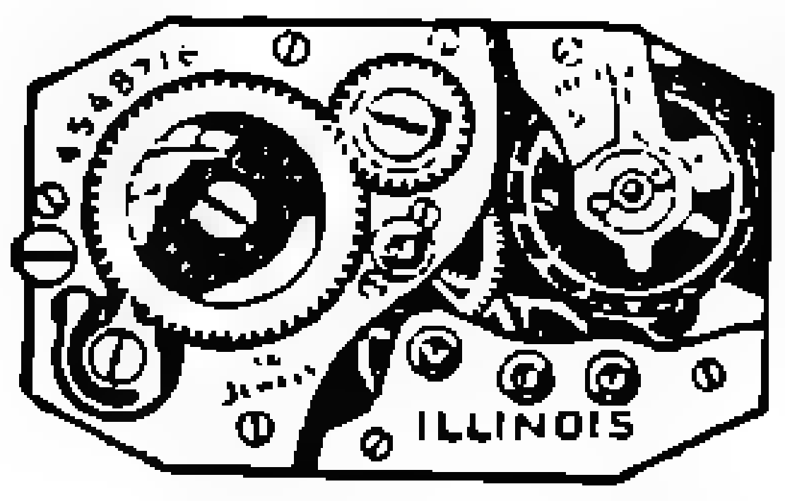

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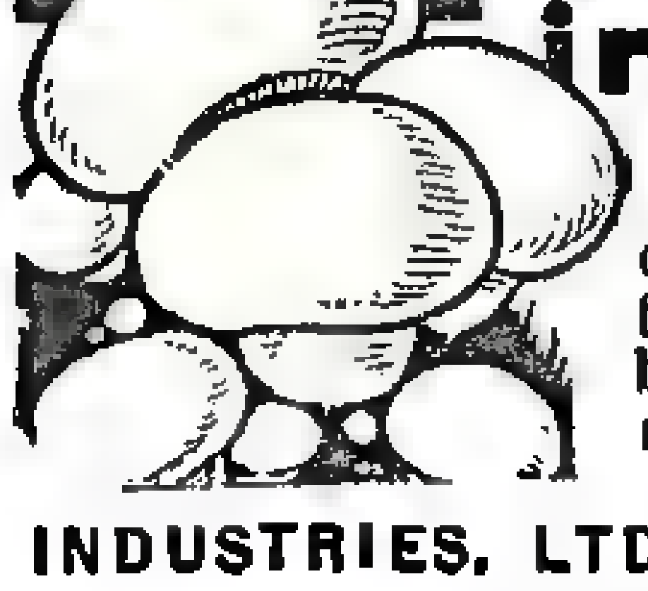

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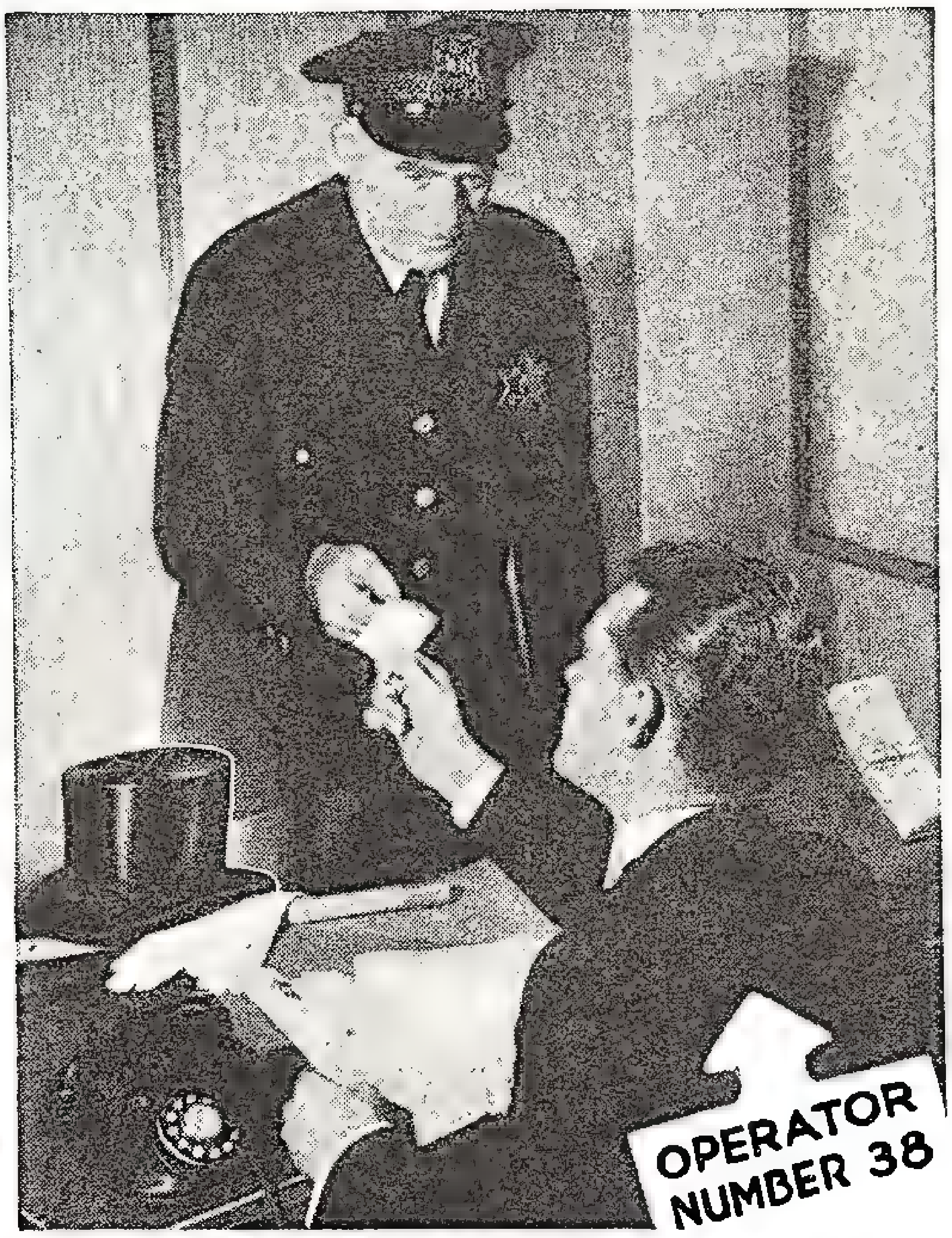

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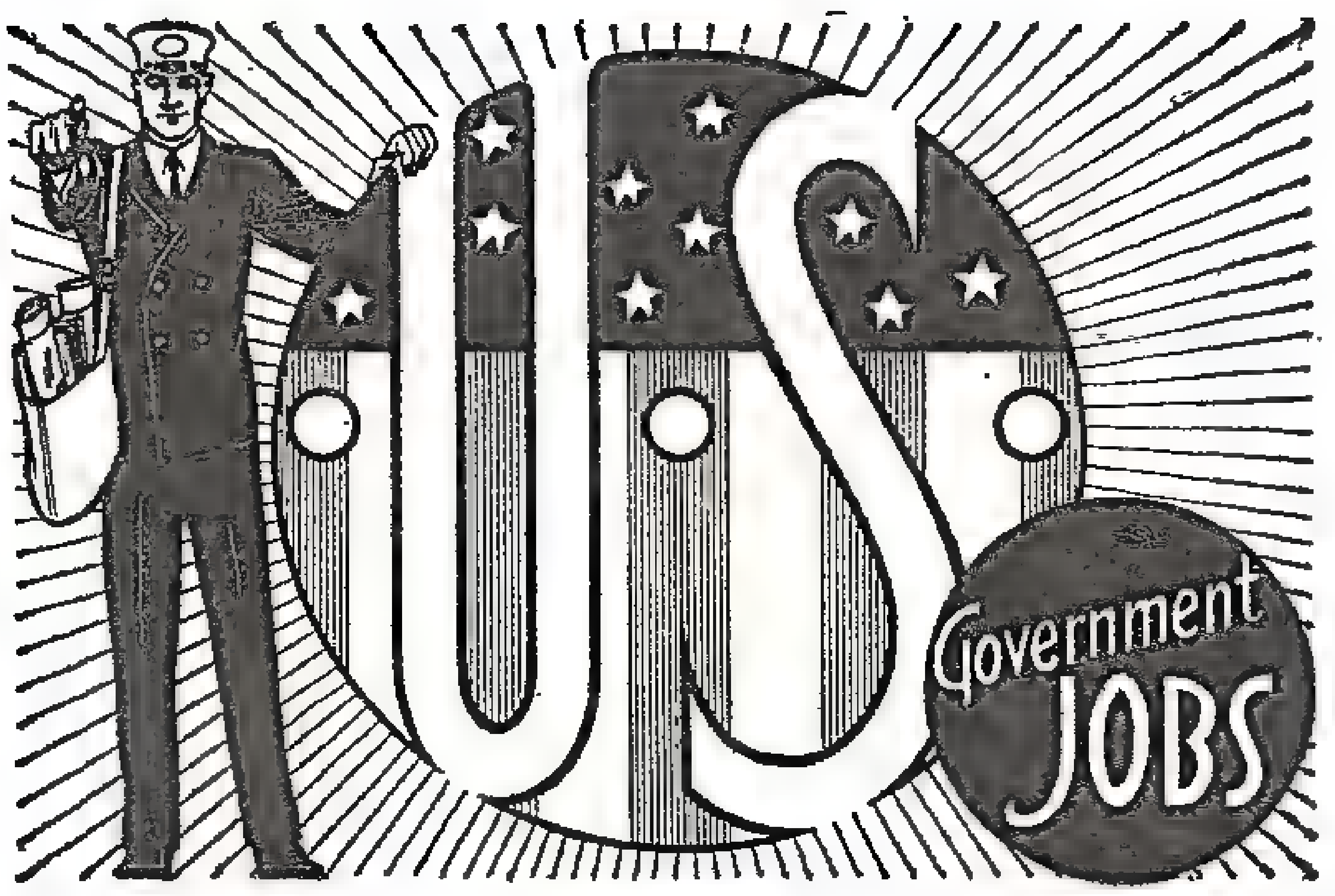

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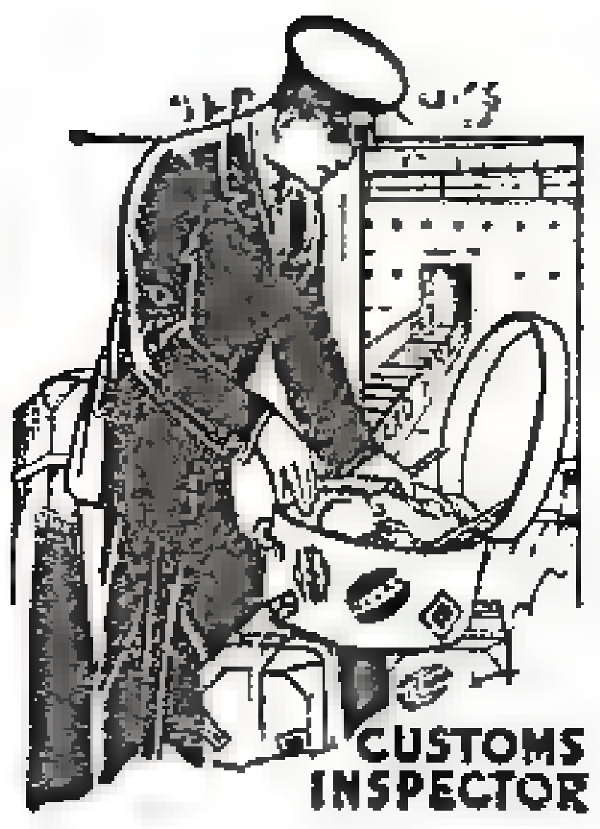

Customs Inspector

Salary $2,100 to start. Men 23 to 45. Work connected with examining baggage and merchandise entering the country from foreign parts covering boats, trains, roads, automobiles, etc.

City Mail Carriers, City Post Office Clerks

Clerks and carriers now get $1,700 the first year regular and automatically increase $100 a year to $2,100 and $2,300. Open to men—women, 18 to 45.

POSTOFFICE CLERK

Railway Postal Clerks

Railway Postal Clerks get $1,900 the first year regular, being paid on the first and fifteenth of each month. ($79.17 each pay day.) Their pay is automatically increased yearly to $2,450. Advance may be had to Chief Clerk at $2,700 a year. ($112.50 each pay day.) Open to men, 18 to 35.

File Clerk—Clerk

Open to Men—Women 18 to 50. Entrance salary $1,260—$1,440 Year. Appointments as File Clerks and Clerks in the Departments at Washington, D. C., are made from this examination.

Get Ready At Once

Many other positions. Experience is usually unnecessary and political influence is not permitted. Let us show you how to get a government job.

Free List of Positions

Fill out the following coupon. Tear it off and mail it today—now, at once.
This investment may result in your getting a big-paid government job.

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Gentlemen: Rush to me, FREE of charge, list of U. S. Government big pay jobs. Send me FREE 32-page book describing salaries, vacations, hours, work, and full particulars telling how to get one of these jobs.

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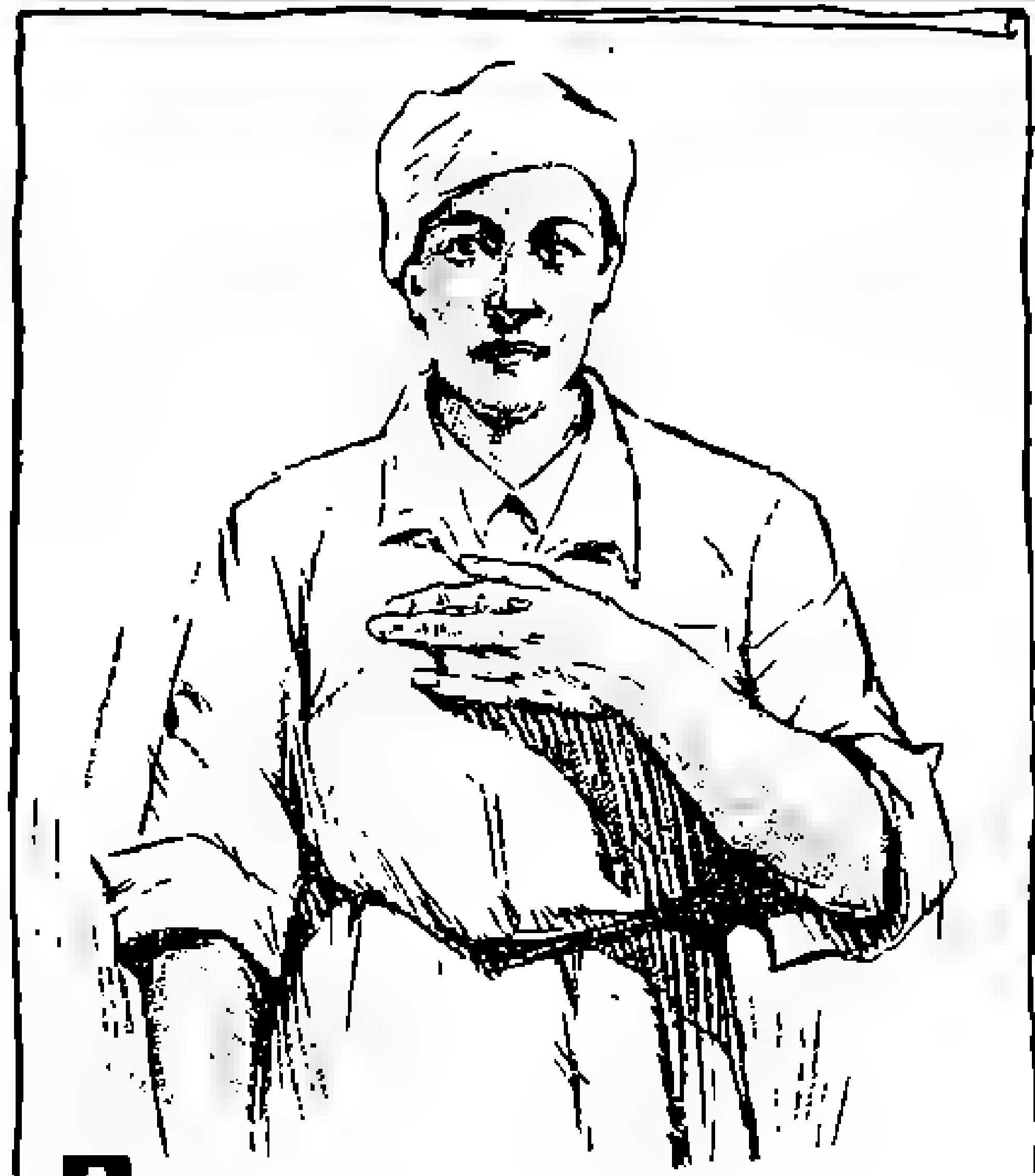
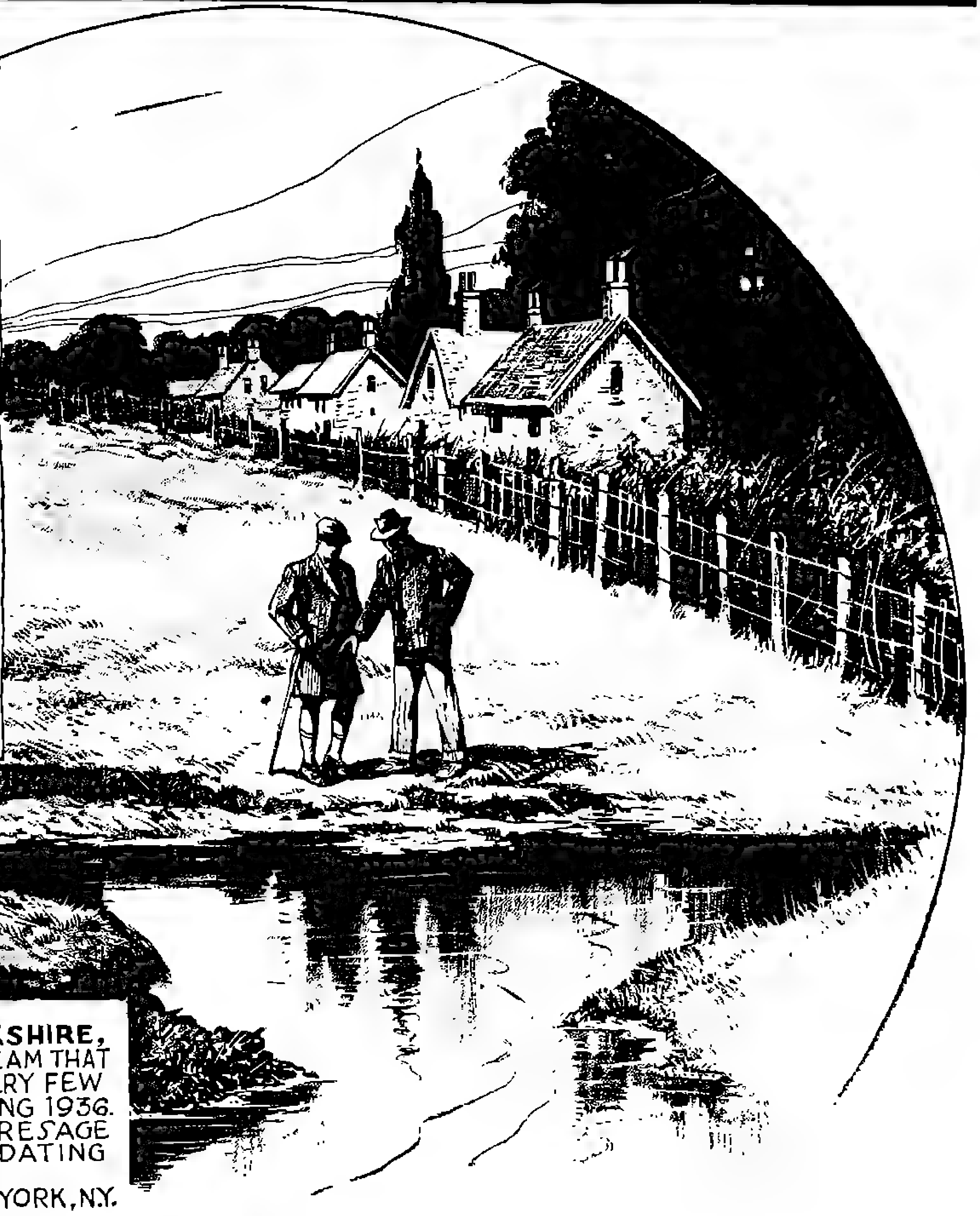
WOE WATERS FORECAST DISASTER

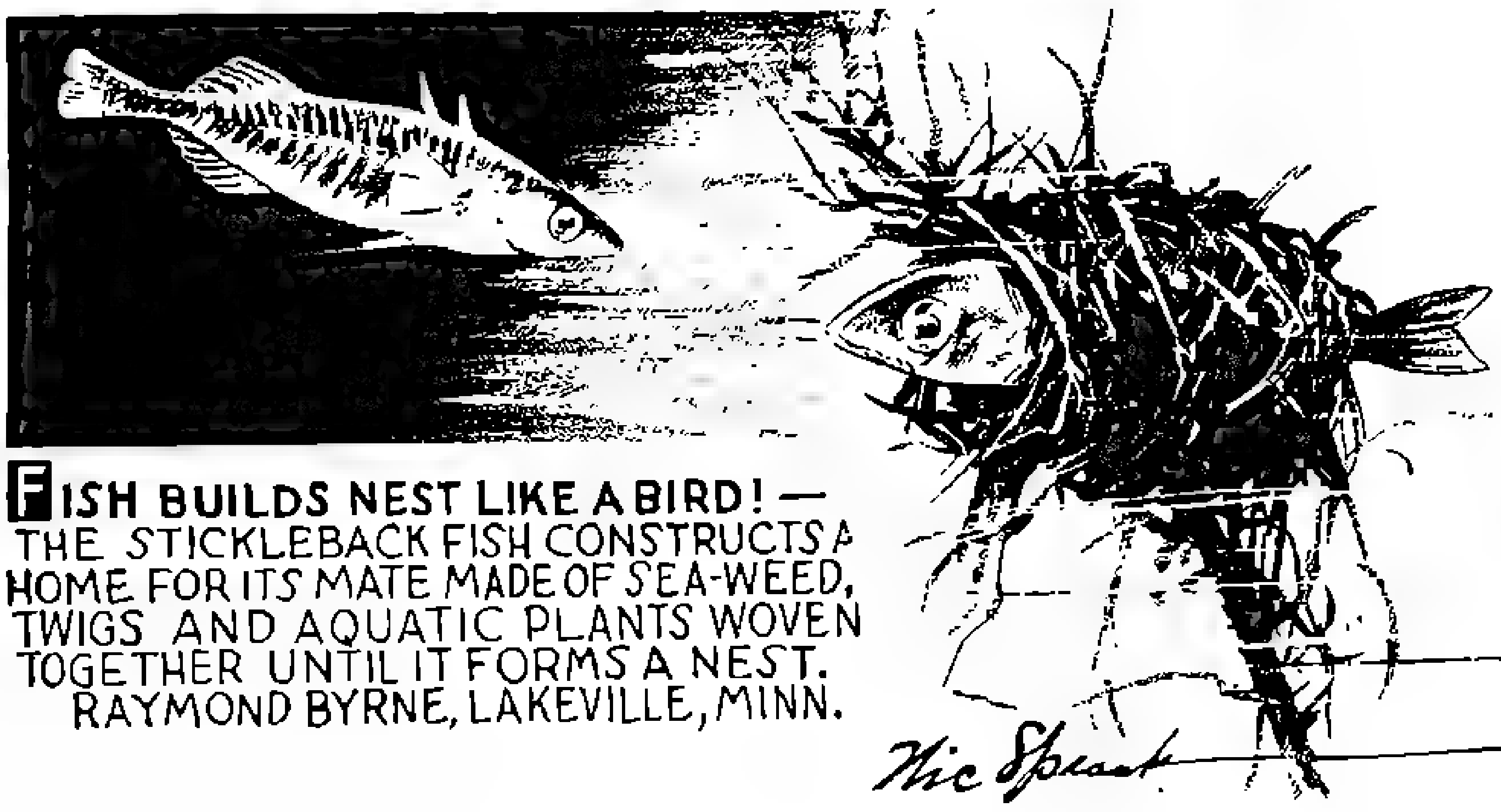
Nic Sprank Offers $5 For Best Oddity



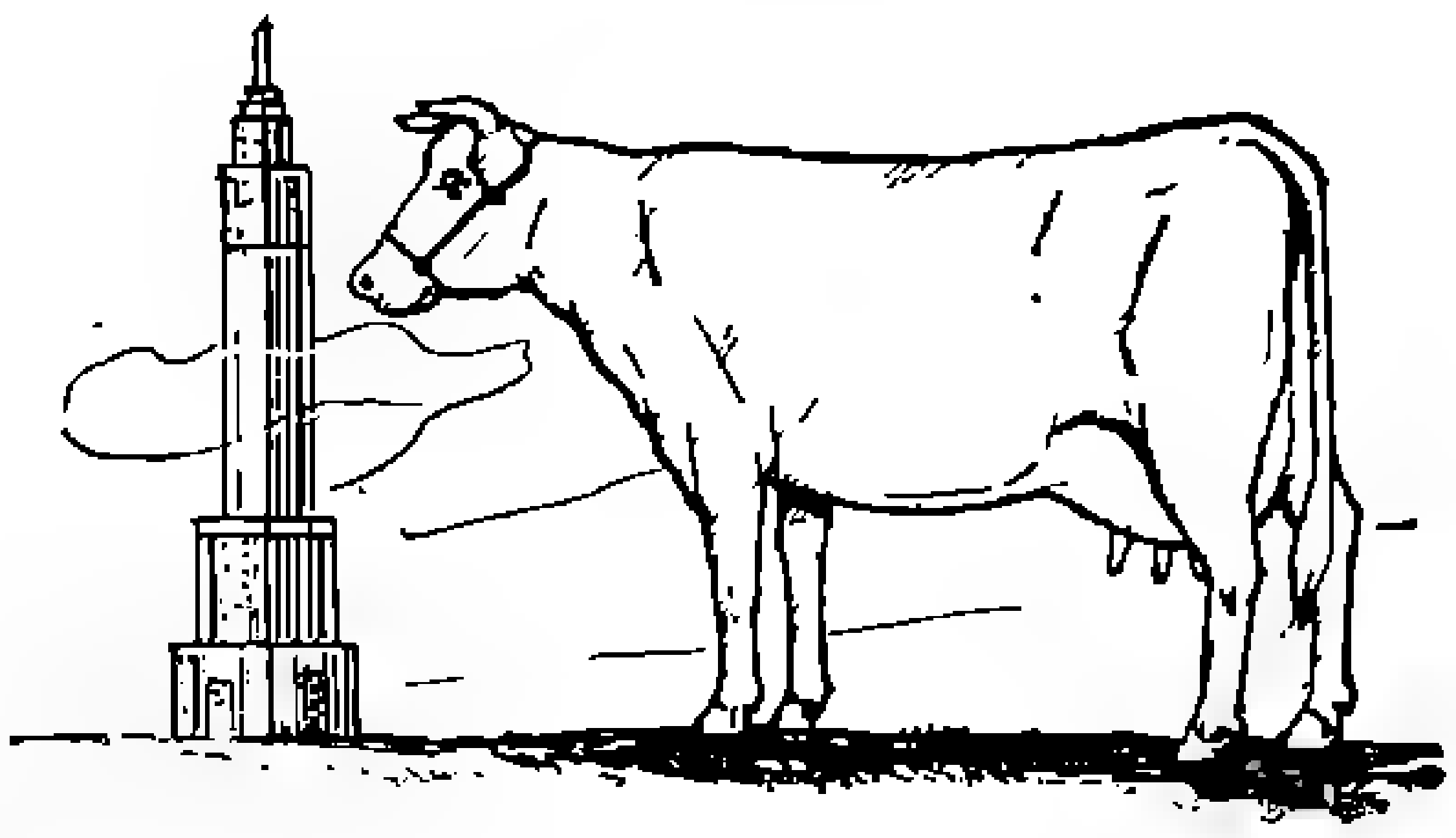
AMPUTATE FINGER TIPS TO PLACATE THE GODS! THE TIP OF THE RING FINGER OF THE BABIES OF THE XKOSA TRIBE IN AFRICA ARE AMPUTATED TO PROPITIATE THE GODS SO THAT THEY WILL PERMIT THE MOTHER TO BEAR MORE CHILDREN.
E. GORDON LEE, CAPETOWN, AFRICA



THE WOE WATERS OF YORKSHIRE, ENGLAND!—A MYSTERIOUS STREAM THAT APPEARS FOR A SHORT TIME EVERY FEW YEARS. IT APPEARED AGAIN DURING 1936. ITS APPEARANCE IS SAID TO PRESAGE WAR AND FAMINE, A LEGEND DATING BACK TO THE 12TH. CENTURY.
JOHN O'BRIEN, NEW YORK, N.Y.



FISH BUILDS NEST LIKE A BIRD!— THE STICKLEBACK FISH CONSTRUCTS A HOME FOR ITS MATE MADE OF SEA-WEED, TWIGS AND AQUATIC PLANTS WOVEN TOGETHER UNTIL IT FORMS A NEST.
RAYMOND BYRNE, LAKEVILLE, MINN.



2,700 COWS IN NEW YORK CITY!— DESPITE THE HIGH COST OF REAL ESTATE AND THE SCANT SPACE, THIS MANY COWS ARE STILL MAINTAINED WITHIN THE LIMITS OF THE METROPOLIS PRODUCING MILK FOR LOCAL CONSUMPTION. THEY ONLY BEGIN TO SUPPLY THE 3,000,000 QUARTS SOLD DAILY IN THE CITY.— GEORGE VAN DYKE, NEWARK, N.J.

Five dollars will be paid for the Oddity used by Nic Sprank as his central illustration. One dollar will be paid for all others used on this page. Send your Oddity to Nic Sprank, Modern Mechanix Publishing Company, Fawcett Bldg., Greenwich, Conn. Source or proof of each Oddity must be given. Send all Oddities separately, not with other manuscripts or letters.

CHEMISTS for INDUSTRY

A Guest Editorial

Emile F. du Pont

THE question of "what does industry expect of its chemists," is one about which much has been written. There are certain factors that we must take for granted. We will assume that all courses are essentially the same. Such qualifications as good character, good health, neat appearance, courage, dependability, and industry we expect in all prospective employes.

Presupposing a good technical background, one of the most important things is good personality. To me this does not mean merely a man with a pleasant smile. It is really the characteristic that enables him to get things done. In modern business it is not the lone wolf who achieves results but rather the combination of the efforts of the group.

A characteristic which we regard as extremely important is loyalty. Considerable public good-will can be obtained by the contacts the public has with a concern's employes, and conversely, a great deal of ill-will can accrue if the employes are not loyal to their employer.

Accuracy is another essential point which we require in our chemically trained men. It is important that when a man makes a statement that he states the facts as they are. The most successful man, of course, is the one who is entirely open-minded and willing to learn as much as possible from others as he progresses up the ladder. A technical education can be regarded as a tool in a man's equipment which will help him achieve his ambitions.

It is generally necessary for industry to train young men to think in terms of money outgo and income. The young chemist who goes into manufacturing work at the start quickly picks up this quality because of his daily association with profit and loss in operations.

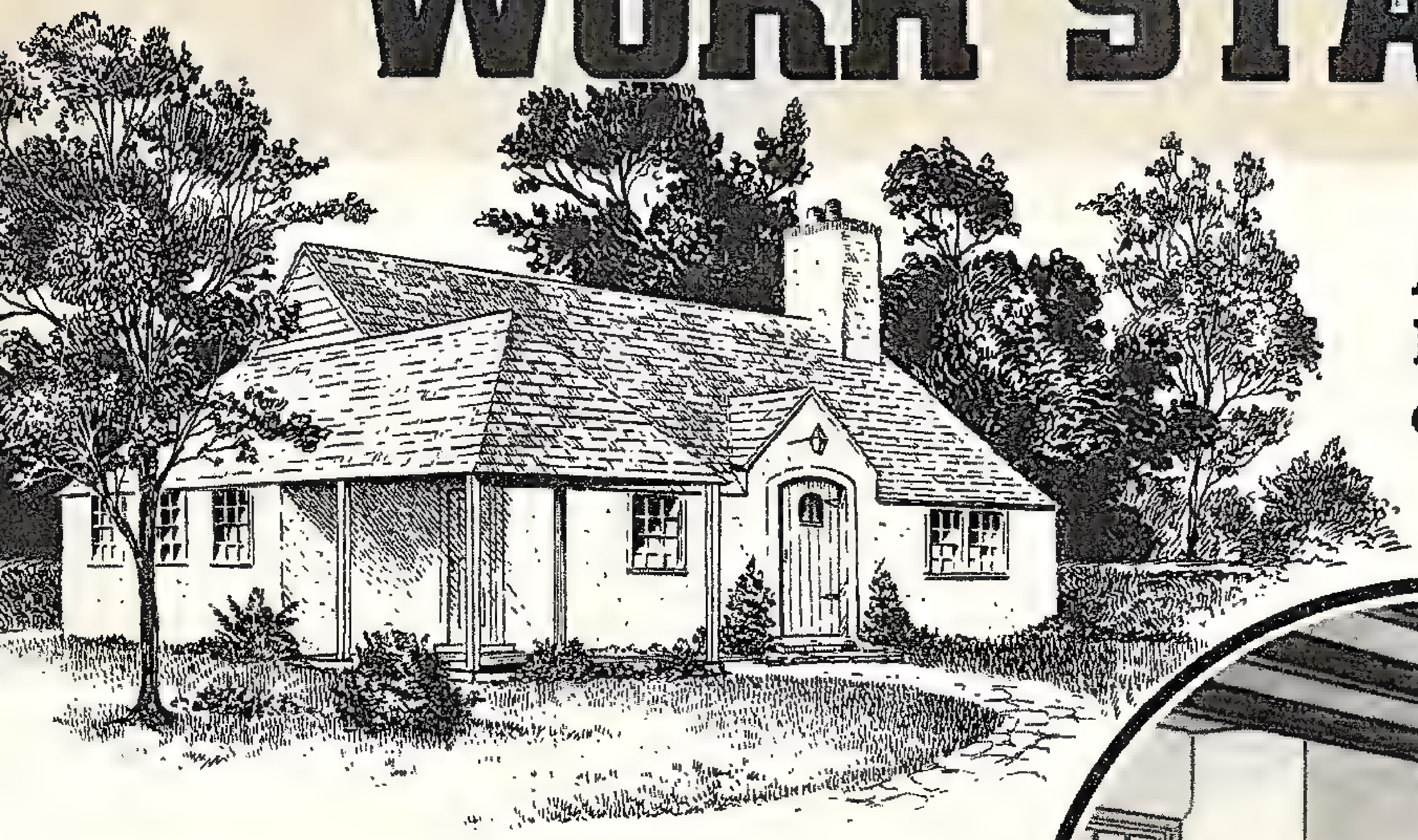
To sum up, still presupposing that he has been subjected to a good technical course, we expect these things of a young chemist. He must have the proper personal qualifications to fit into and develop in an organization. He must have a mental excellence as indicated by class standing and should have broadened himself by extra curricular activities. He should be loyal. He should have ability to speak and write clearly and concisely. He should be accurate. He should have some knowledge of the cost of doing business. He should have an understanding of modern industrial organization.

Emile F. du Pont

PERSONNEL MANAGER

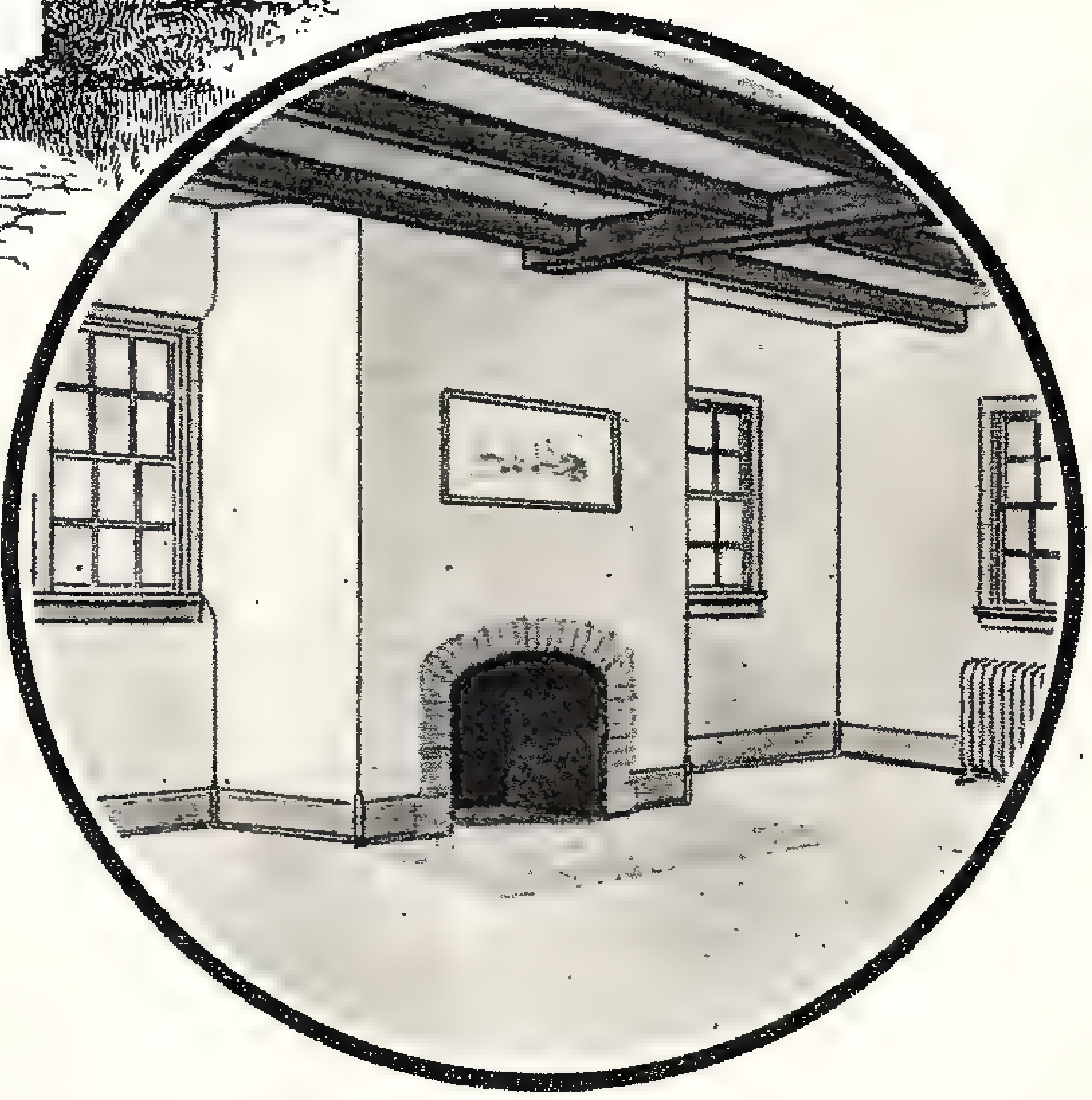
E. I. du Pont de Nemours & Co.

WORK STARTS



Architect helps builder obtain best for money.

This attractive $3,500 model residence is being constructed by Modern Mechanix in Leonia, N. J., five minutes' drive from the George Washington Bridge over Hudson River. It will demonstrate the ease with which the average man can finance and build his home.



Specifications for the home call for a brick wood-burning fireplace in addition to a steam heating system designed to maintain an even temperature of seventy degrees even in sub-zero weather.

CONVINCED of the ease of building their own homes, Tom and Jim and their wives purchased their building lots. Now spread before them were the blueprints—the plans of dreams which a short while before seemed impossible. Yet they were fast coming true.

Jim had a small grocery store, $3,000 in savings and two children for whom he was doing his best in a crowded city flat. Tom, on the other hand, was a clerk earning $1,200 a year. After many years of strict economy he and Mary had managed to save $1,600. Jim liked to find his recreation puttering about in a home workshop; Tom was an amateur photographer, with a passion for doing his own dark-room work. Their city flats did not afford room for their hobbies.

They were discussing these one day when Bill Johnson, who worked in an architect's office, showed them how his Boss could help them build their own homes which could be paid for at a cost cheaper than rent.

Tom's home—a one-story, four-room house to be built at a cost of $3,500 in Leonia, N. J., a few minutes from the George Washington Bridge that connects New York and New Jersey—has been selected as a model home by this magazine, and construction is under way.

Tom learned that with $1,230 in cash—including $600 for his lot—he could secure a loan of the additional $2,870 necessary from an independent building and loan association or one connected with the Federal Home Loan Bank or the Federal Housing Administration. The loan, payable at $29 a month, must be paid back in ten years.

Jim, because of his two children, required a bigger house. His two-story, five-room home will cost $5,500. Of this amount he has $1,890 cash, and must seek a loan of $4,410, which he must pay back at the rate of $45 a month for the next ten years.

Since the day they decided they could afford to build their homes things had been moving rapidly. Everything was ready now to submit to the contractors.

The blueprints of plans and elevations of both houses, with specifications fully explaining just what must be built into the homes and how to do it, included all the suggestions that Tom, Jim and their wives had made.

on MM HOME

by Wesley Sherwood Bessell

New York Architect

All the ideas that they desired in a home were carefully worked out. The plans were drawn up to a scale of one-quarter inch to the foot, and were similar to the original smaller sketches but with such changes as they had carefully discussed. It was agreed that requests for estimates be made at once.

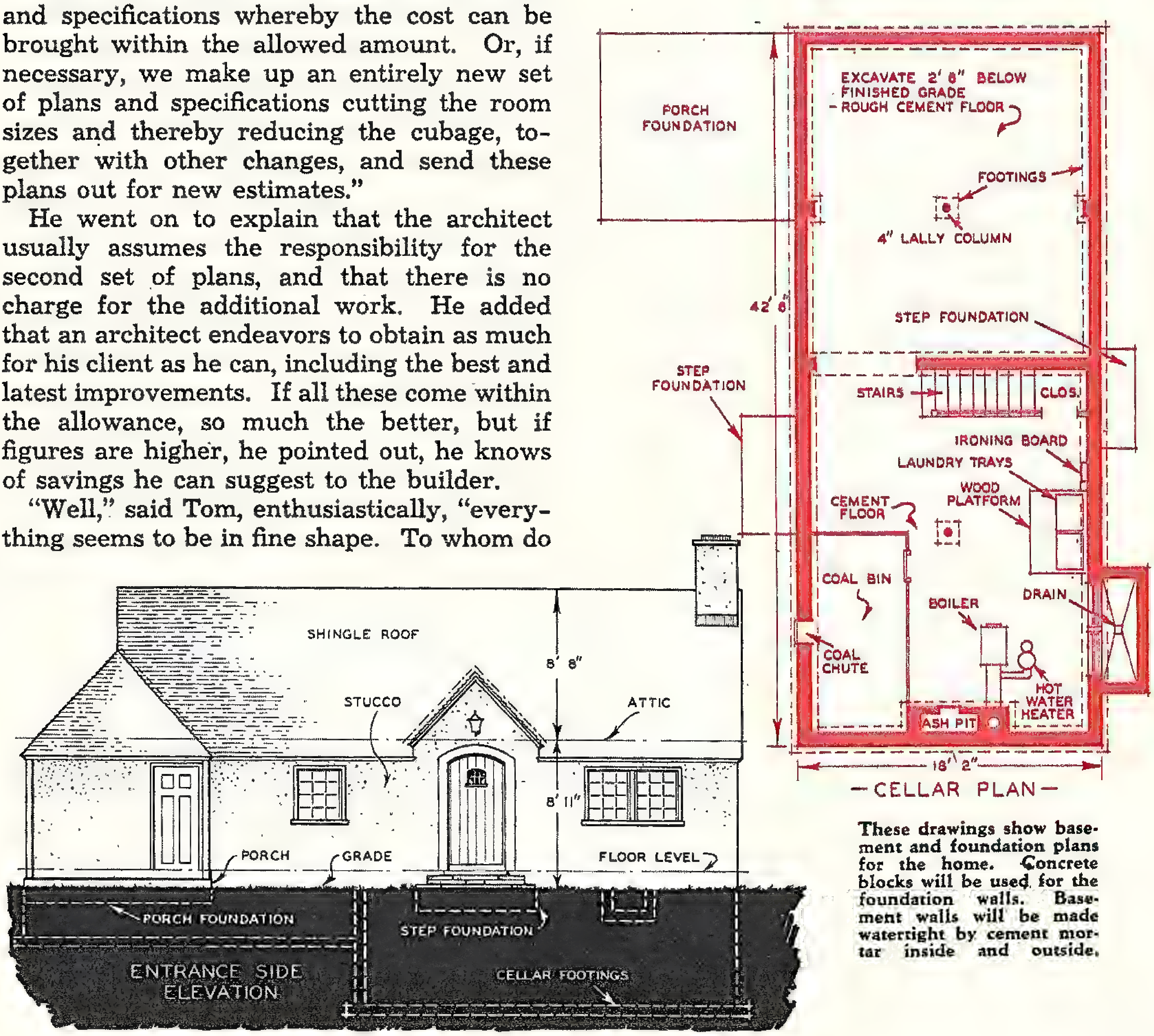
"But what if the figures run more than our allowances?" asked Tom.

"In that case," Bill answered, "we usually call in the two lowest bidders and suggest that certain modifications be made in the plans and specifications whereby the cost can be brought within the allowed amount. Or, if necessary, we make up an entirely new set of plans and specifications cutting the room sizes and thereby reducing the cubage, together with other changes, and send these plans out for new estimates."

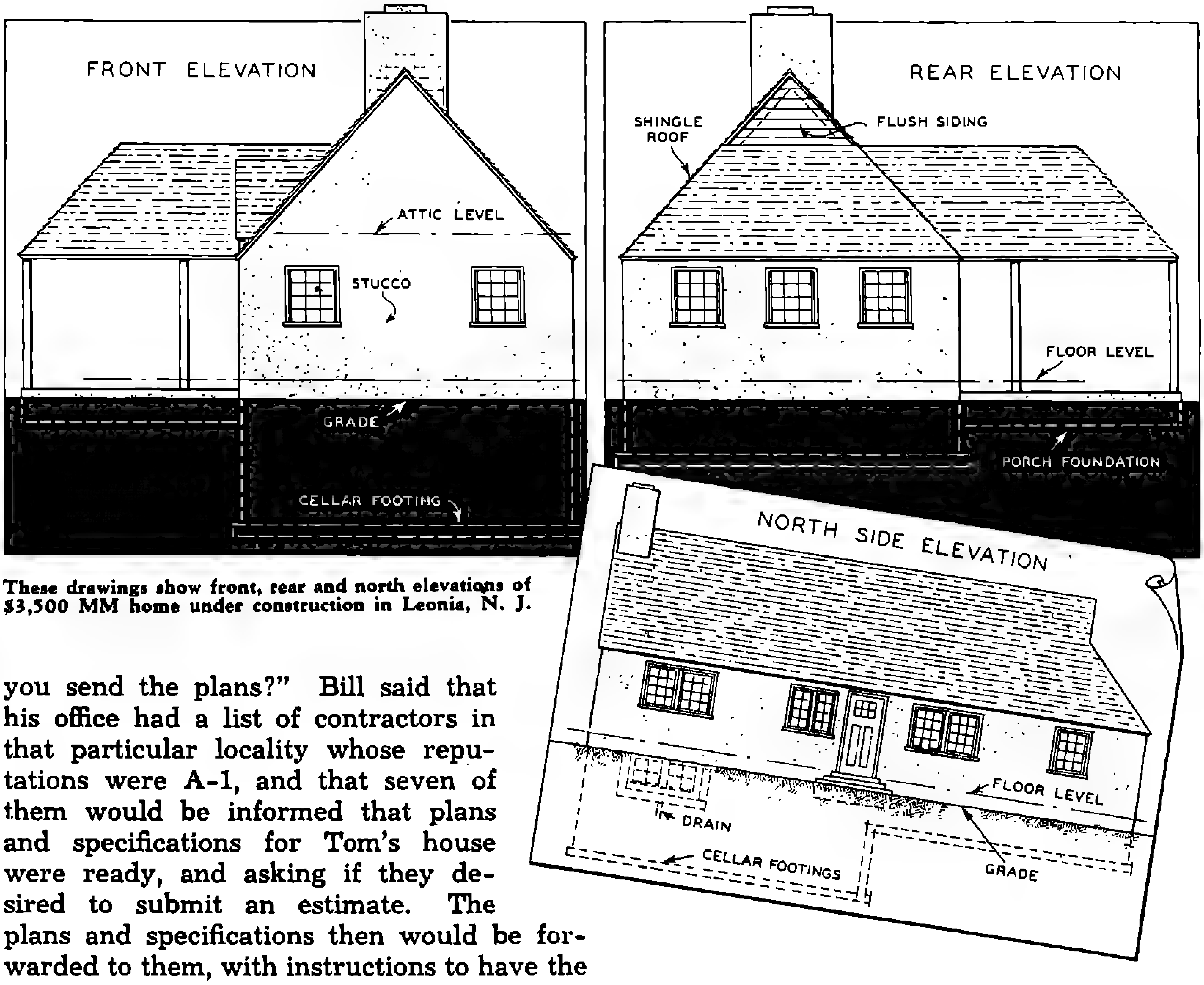
He went on to explain that the architect usually assumes the responsibility for the second set of plans, and that there is no charge for the additional work. He added that an architect endeavors to obtain as much for his client as he can, including the best and latest improvements. If all these come within the allowance, so much the better, but if figures are higher, he pointed out, he knows of savings he can suggest to the builder.

"Well," said Tom, enthusiastically, "everything seems to be in fine shape. To whom do

Wesley Sherwood Bessell, the author, is well known for the homes, schools and postoffices designed by him in recent years in Long Island and New Jersey.


PORCH FOUNDATION
EXCAVATE 2' 8" BELOW FINISHED GRADE
ROUGH CEMENT FLOOR
FOOTINGS
4" LALLY COLUMN
42' 6"
STEP FOUNDATION
STEP FOUNDATION
STAIRS
CLOS.
IRONING BOARD
LAUNDRY TRAYS
WOOD PLATFORM
CEMENT FLOOR
COAL BIN
BOILER
DRAIN
COAL CHUTE
HOT WATER HEATER
ASH PIT
18' 2"
— CELLAR PLAN —
SHINGLE ROOF
8' 8"
STUCCO
ATTIC
8' 11"
PORCH
GRADE
FLOOR LEVEL
PORCH FOUNDATION
STEP FOUNDATION
ENTRANCE SIDE ELEVATION
CELLAR FOOTINGS

These drawings show basement and foundation plans for the home. Concrete blocks will be used for the foundation walls. Basement walls will be made watertight by cement mortar inside and outside.



These drawings show front, rear and north elevations of $3,500 MM home under construction in Leonia, N. J.

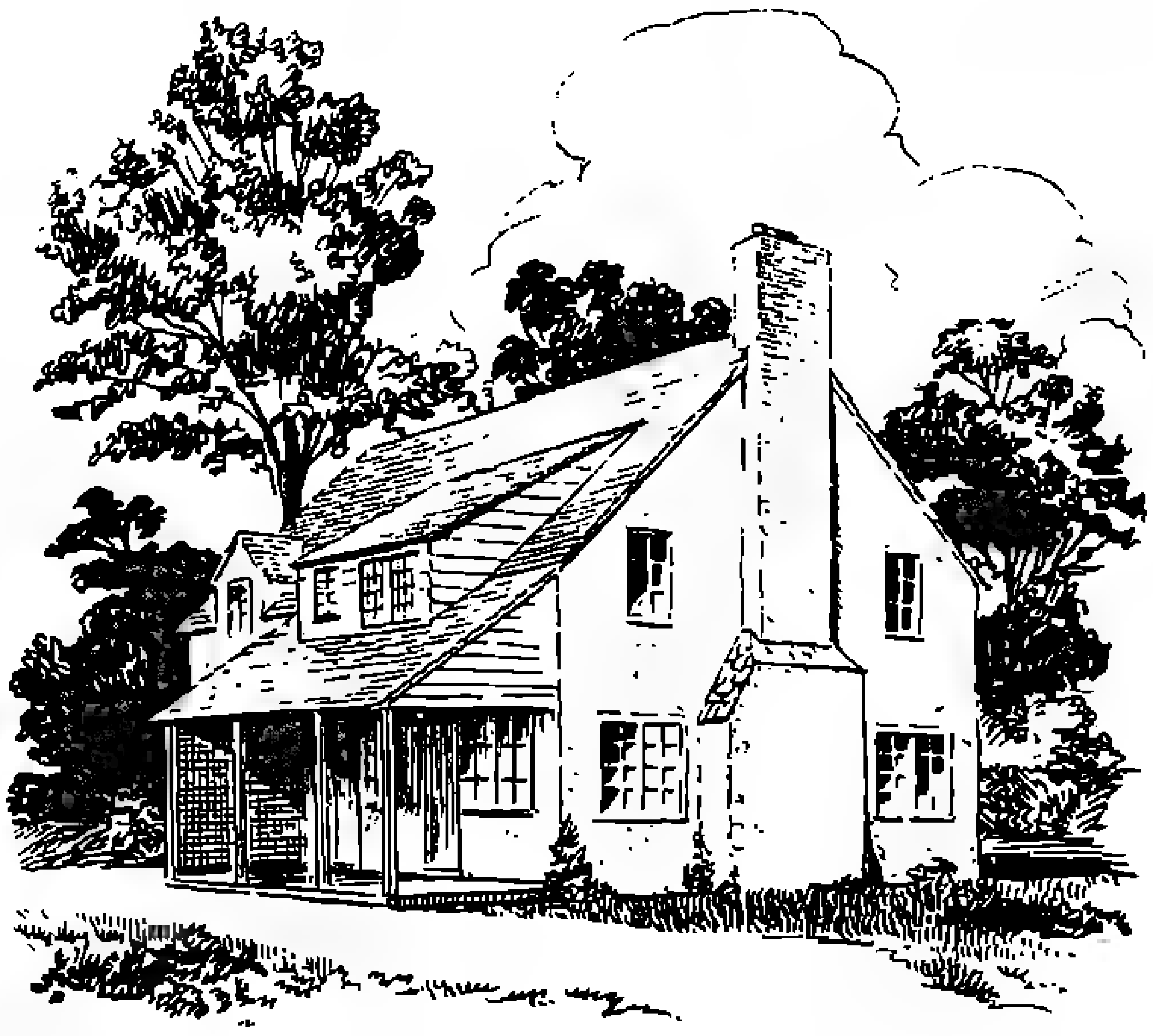
you send the plans?" Bill said that his office had a list of contractors in that particular locality whose reputations were A-1, and that seven of them would be informed that plans and specifications for Tom's house were ready, and asking if they desired to submit an estimate. The plans and specifications then would be forwarded to them, with instructions to have the bids back in the architect's office on a specific date. In Tom's case he said a two-weeks limit would be sufficient on bids.

The contractor, Bill went on, estimates on everything, including plumbing, heating and electrical work. By having one man responsible for the erection and completion of the entire house, Bill explained, the architect is unaware of the wrangling between subcontractors, if one should be inclined to blame the other for delays and holding up of the work. The general contractor, he pointed out, thus co-ordinates the various trades and sees to it that everything is kept moving. Bill then detailed what he meant by supervision of the work by his office, explaining that he will visit the job once a week and inspect all the work and material.

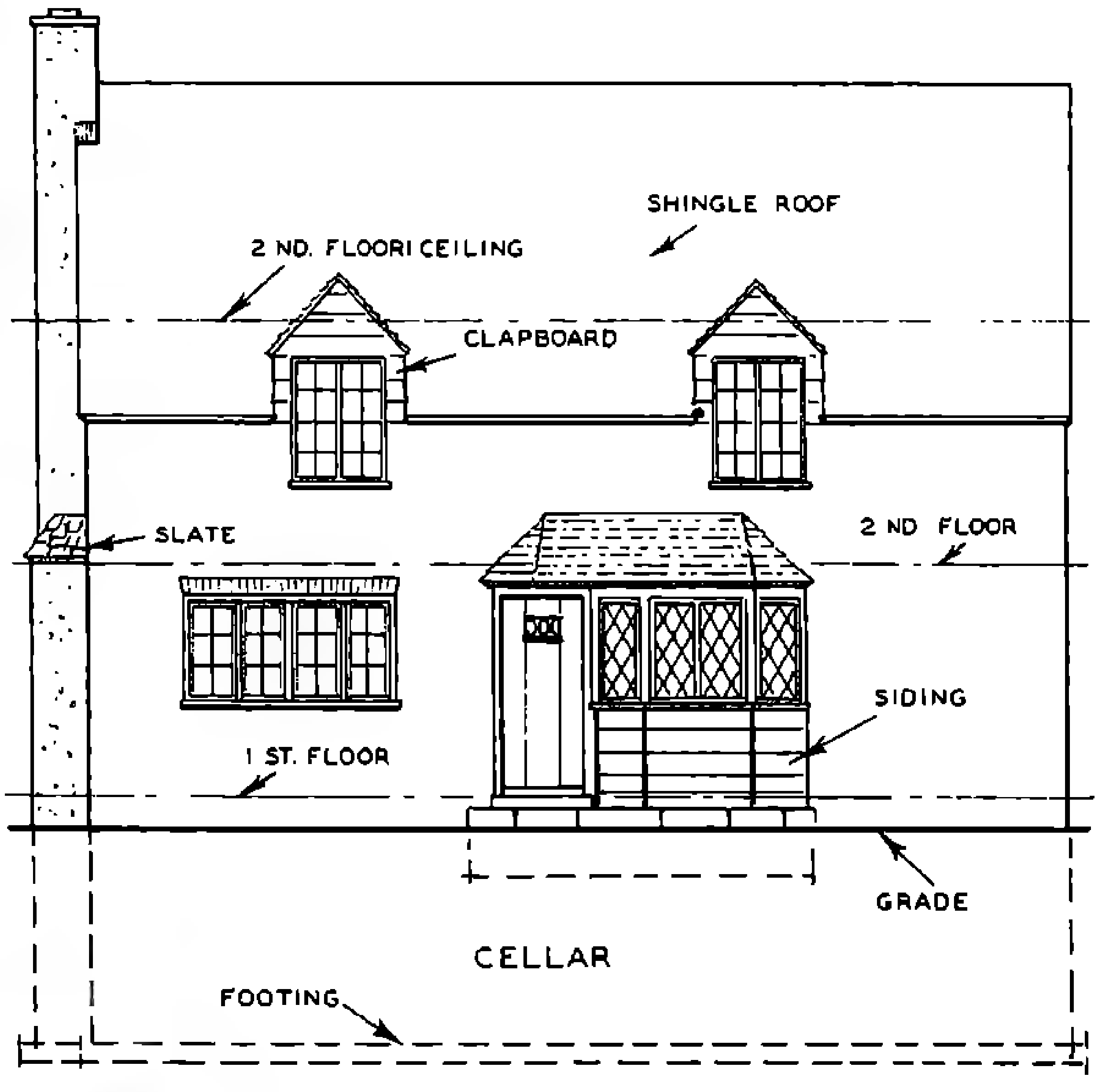
"I will know whether or not we strike water when we excavate; when the footings are placed, I will see that the concrete is of the correct mix and placed at the proper level. I must make sure that the proper materials are used in the foundation walls, and that the work is well constructed. After that the floor beams and wall plate are put into place. The plate must be secured to the foundation walls by anchor bolts, and the floor beams must be of the specific sizes and grades. These must be properly spaced and cross-bridged. The exterior framing, such as studding, rafter plates, attic beams and rafters must all be checked.

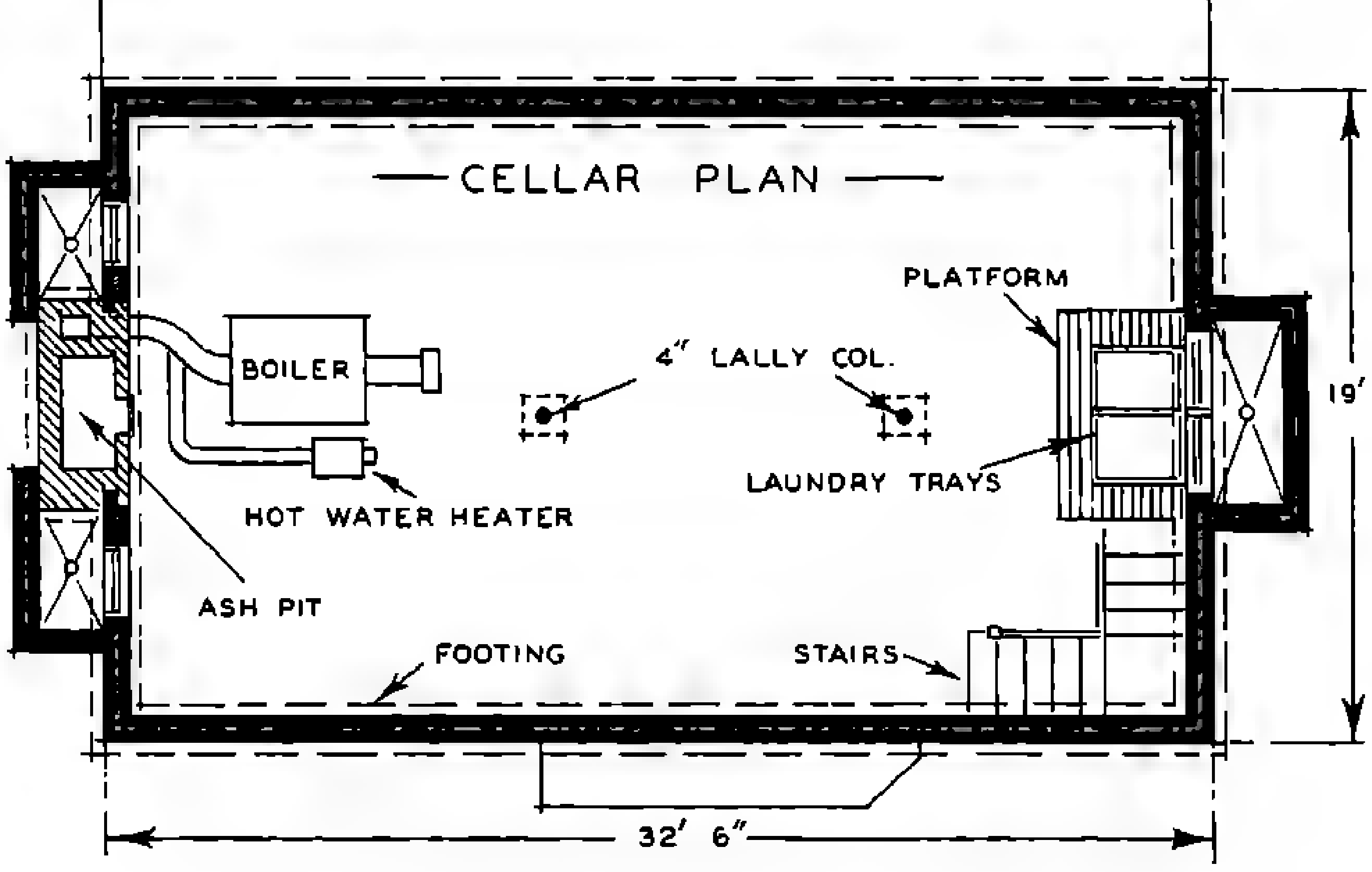
"Then comes the sheathing and roof lathing for shingles. Wood shingles will last some 20 to 25 years. I have seen some shingles 100 years old. While this work progresses the plumber, the steamfitter and the electrician will start their rough work, putting in piping and wiring. This must also be inspected, and in the case of the plumber, when his work is all roughed in, he puts on a test for my inspection.

"These same mechanical contractors also must be watched when cutting beams in order to run their various pipe lines. You can only cut a certain amount of slots out of a beam or stud with safety. Too deep a cut becomes dangerous. Very often the plumber, or steamfitter, is interested only in getting his pipes to the desired spot for his work, and will cut too deep into structural beams or studs, weakening them."



This illustrates the type of model residence which can be built for $5,500. There are two floors giving ample room for a growing family. This is a back view.





These drawings indicate the front elevation, window arrangement, cellar plan and similar features of the more expensive house which is being described in this series of articles.

"There seems to be a great deal to know about and to watch out for," remarked Tom.

"You are correct there," said Bill. "These things are only a part of the many details that come under the scope of proper supervision. Without supervision many things can be covered up, and these defects only become apparent as time goes on."

At the end of three weeks the final estimates were received. Both Tom and Jim were eager to know the outcome.

"It is like an election—you don't know the result until all the figures are in," said Jim. "But the news is not so encouraging for you, Tom. Your figures ran considerably over your allowance."

Tom was disappointed, but realized that such things happen, and so was ready to abide by Bill's advice and be patient.

At a second meeting two weeks later, Tom was told that, by using coal for heating in place of oil; substituting stucco for the brick veneer; simplifying the waterproofing, as the contractor assured Bill that the cellar would be dry in this particular location; reducing the size of the house by one foot, and a few other minor changes, the work could be started at once.

The contract made between the contractor and the owner was the standard form of agreement issued by the American Institute of Architects, and which is recognized in all courts. It covers the time of completion, the contract amount, the time of progress payments, the final acceptance of the job and the final payment.

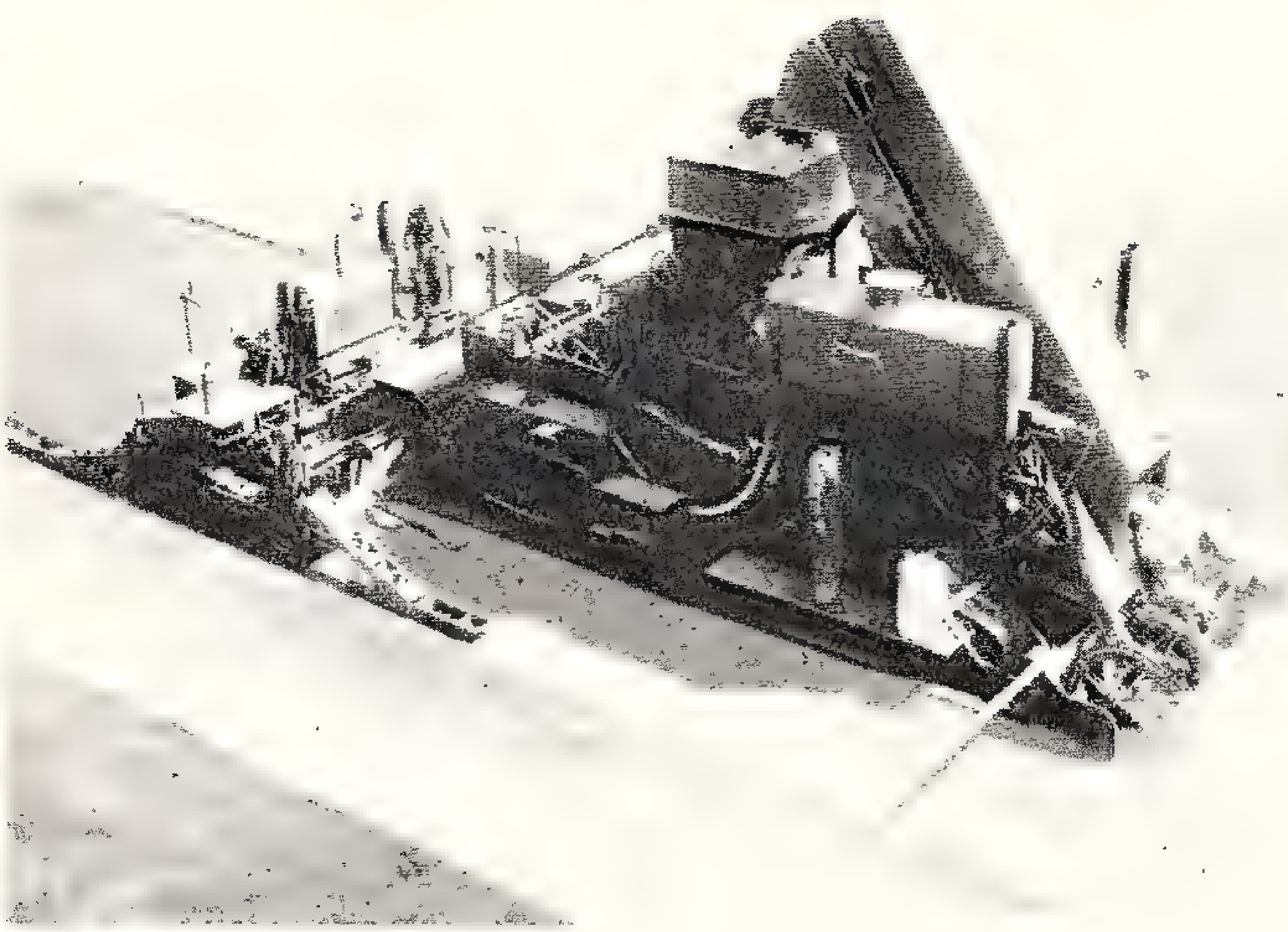
That night Tom and Mary pored over the specifications and general conditions of the contract they had signed, and were more and more elated over the splendid little home they were about to build.

"It seems almost unbelievable," remarked Tom. "Although we are putting everything we have in it, I didn't think you could get much more than a shack for what we could afford. Yet no more pains could be taken to make the house perfect if it was costing a hundred times as much."

They thought they could hardly wait until the workmen started the excavation for the

[*Continued on page* 153]

Huge Machine Builds Road In Single Operation



Taking in road building material at one end, this huge gasoline-driven engine mixes them and proceeds to lay a farm-road pavement at the rate of one mile per day.

TRAVELING at the rate of one mile per day, a big self-contained paving plant on wheels gulps up road building material at its front end, thoroughly mixes it with bitumin, and discharges it at the rear in the form of a finished 20-foot wide "farm-to-market" type pavement.

The machine is operated by powerful gasoline engines and travels on crawlers. Manufactured by the Barber-Green Co., of Rockford, Ill., it is widely used in the arid districts of the West, where it uses the desert sand, one of the principal ingredients of the road building operation. The speedy road paver is economical.

Typewriter Has 2,000 Keys

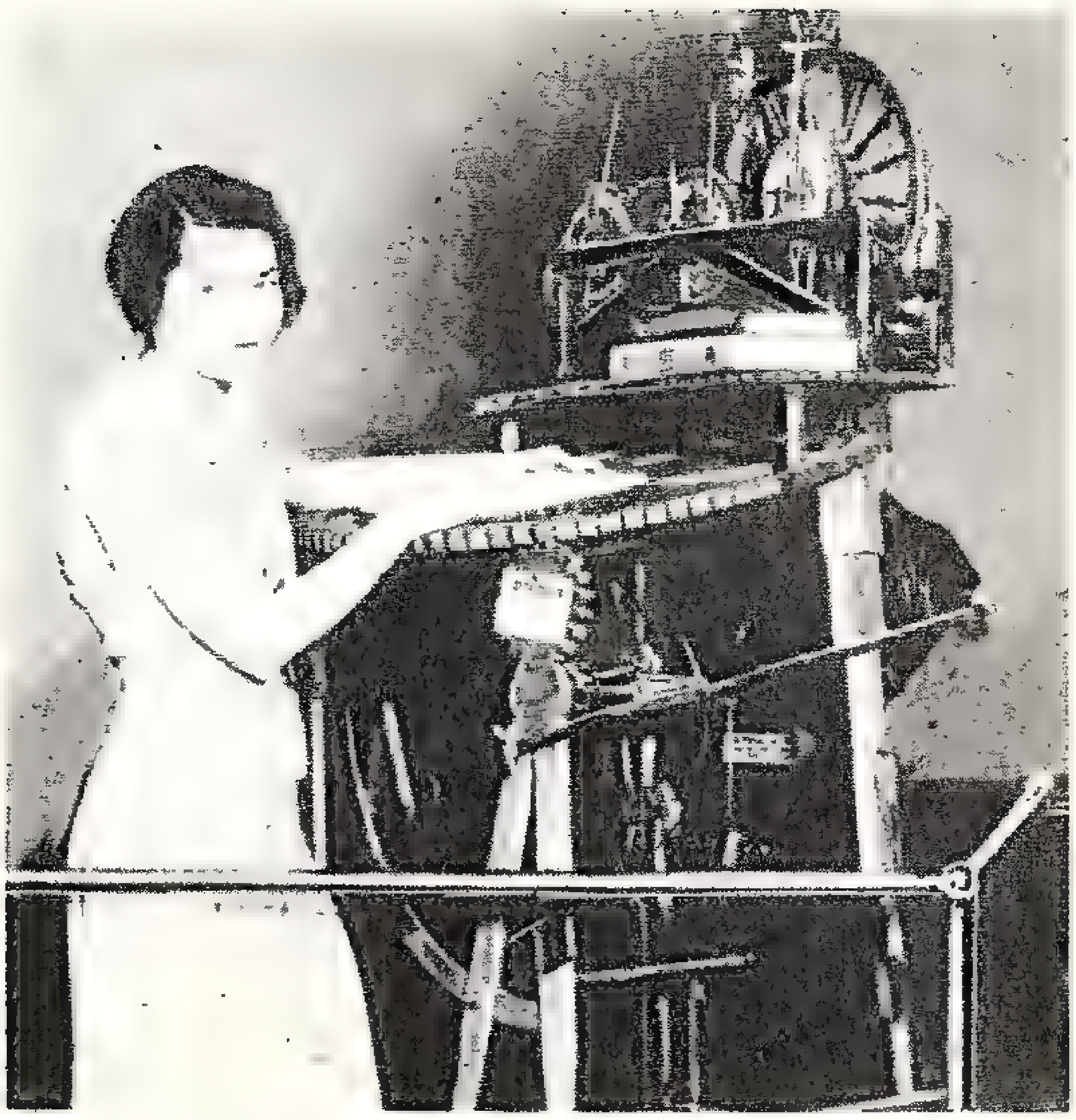
AN INGENIOUS typewriter containing 2,000 Japanese ideograms besides the usual assortment of Roman characters for European languages, has been invented by Hizen Izutsu, teacher at a vocational school in Osaka, Japan.

Despite the enormous keyboard capacity, the novel typewriter is smaller than many ordinary standard typewriters previously in use. The machine sells at about $50.

Simple in operation, there is but one type-lever. It picks up the type, one piece after the other, from a movable lettercase, and places them back immediately after the touch is performed.

Hizen Izutsu, Japanese inventor, watches a student operate his new typewriter. It has a keyboard of over 2,000 letters and types notes in both Japanese and European languages.

College Has Study Enforcer



This study enforcer scoops up a book and places it before the student. Built 75 years ago by John Muir, famed naturalist and writer, it is owned by University of Wisconsin.

AN OLD machine owned by the University of Wisconsin is called the study enforcer. The unusual device is actuated by a clock-like mechanism and its mechanical fingers scoop a book off the desk and return another one until the student has completed reading the scheduled volumes.

Air Commerce Bureau Adopts Radio Typewriters

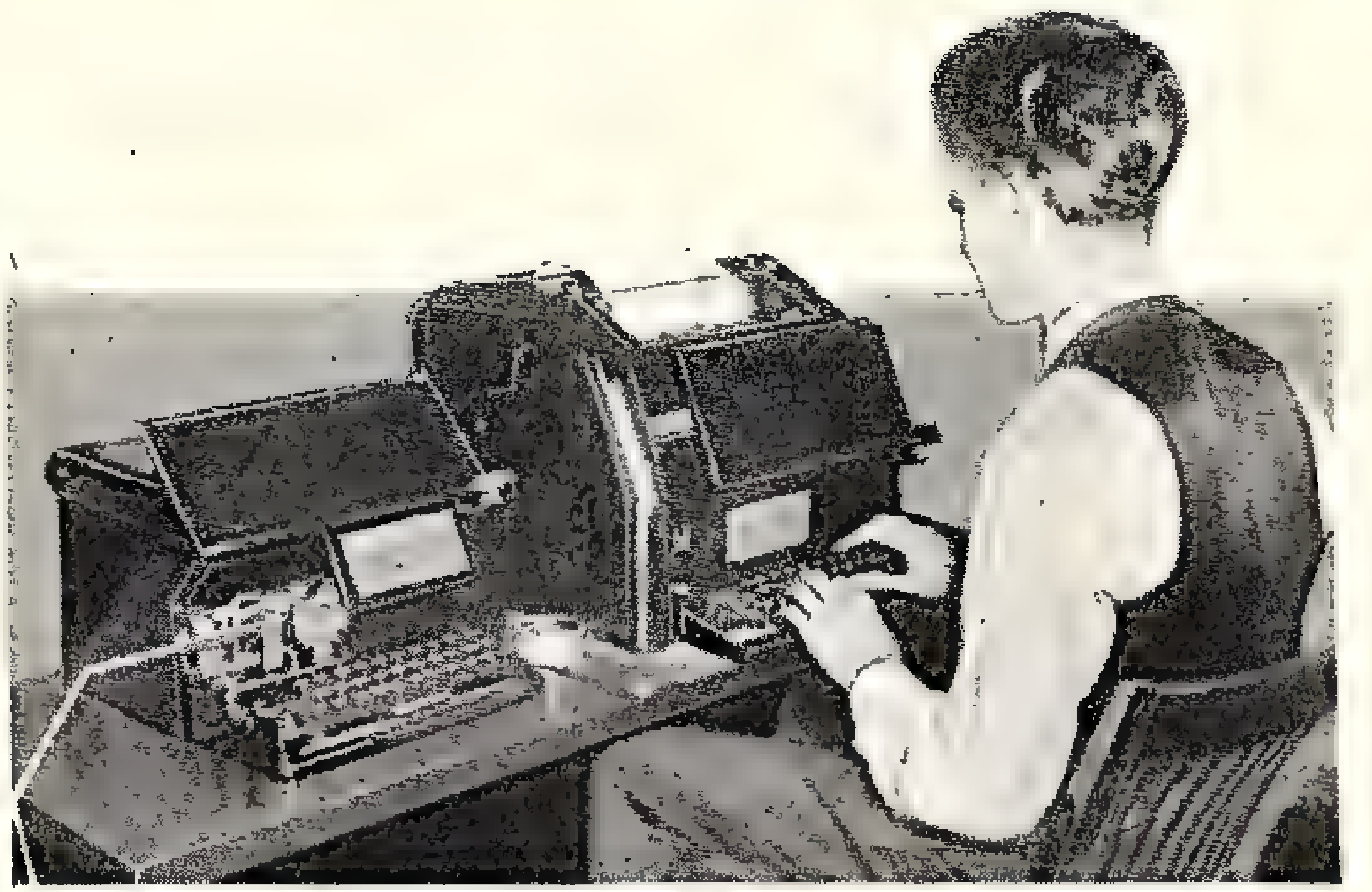
A SERIES of radio-operated teletypewriter machines over which weather reports can be transmitted simultaneously without the use of wires is being installed along the Washington, D. C.-Nashville, Tenn., airway route by the Bureau of Air Commerce. The machines have been in experimental use between Baltimore, Md., and Washington for the past year and a half.

The typewriters can also be installed and operated from transport planes, the weight of the machine being insignificant, particularly since it would insure against error in the receipt of weather reports. At the same time the machine provides a permanent record of the reports. Installation of the machines will cost about $200,000, but it is expected that the savings effected will make up the cost within a period of three years.

Blind Man Remodels Home

Although totally blind, M. F. Jones, of Tampa, Fla., remodeled his large five room home into a modern building consisting of eight apartments. He did all carpentry work unaided.

OVERCOMING the handicap of being blind, M. F. Jones, of Tampa, Florida, remodeled an entire house unaided. One of the features of the job was the removal of an enclosed stairway and the rebuilding of it on an outside porch. Before losing his sight, Mr. Jones had been a construction foreman.

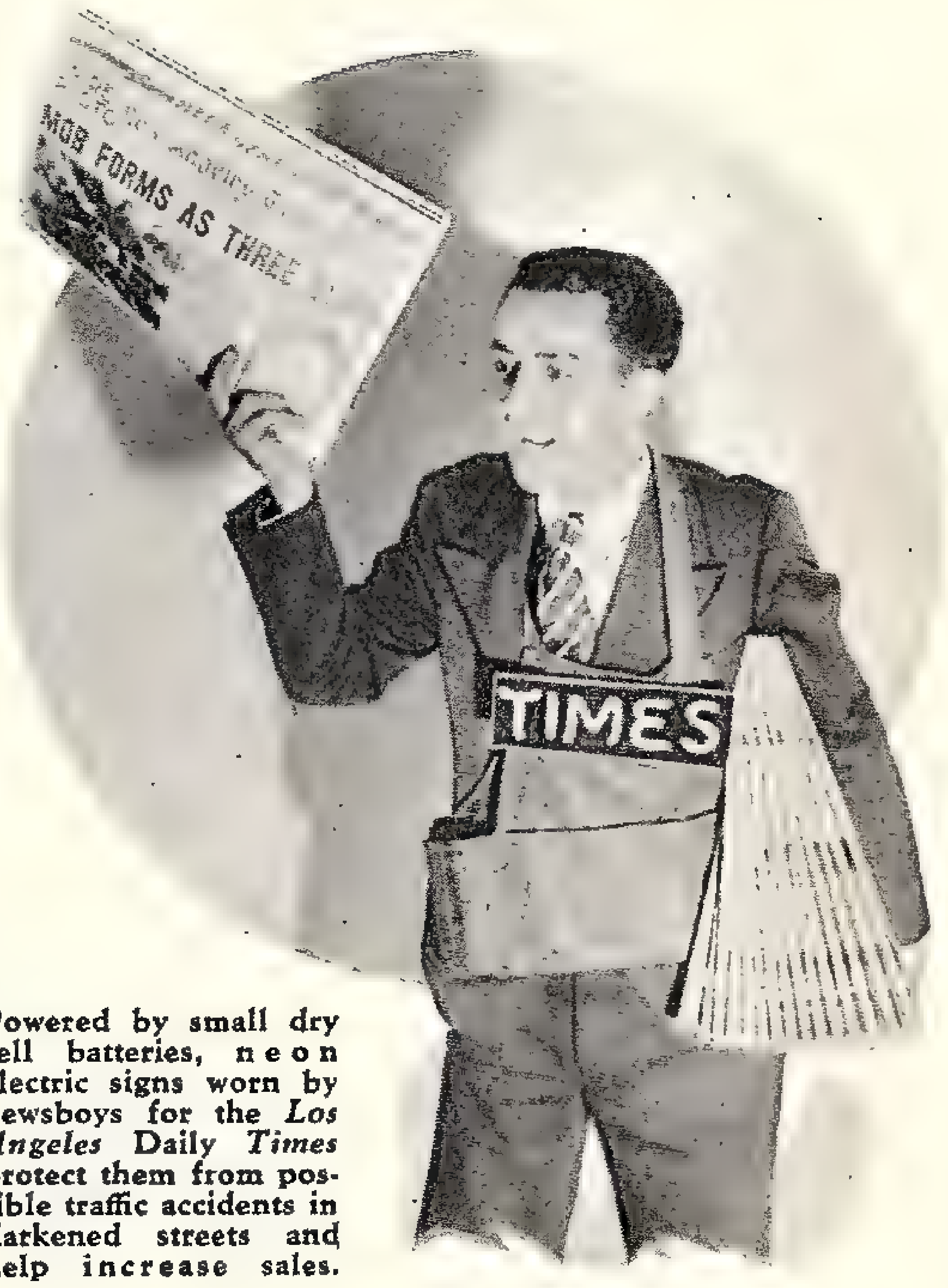


The Bureau of Air Commerce will use radio-operated teletypewriters like these to send weather reports to airports and airplanes. R. B. Ladd demonstrates device at Silver Hill, Md.

Newsboys Wear Neon Signs

NEWSBOYS who sell the *Los Angeles Times* are supplied with small neon electric signs having the word "TIMES" in capital letters. The signs, worn at night, stand out in traffic and protect the boys against possible accidents from passing autos.

The signs were designed by A. A. Allen, an electrical engineer, and will burn steadily for 48 hours without changing the dry cell battery. These signs, besides protecting boys, attract pedestrians and increase sales.



Powered by small dry cell batteries, neon electric signs worn by newsboys for the *Los Angeles* Daily *Times* protect them from possible traffic accidents in darkened streets and help increase sales.

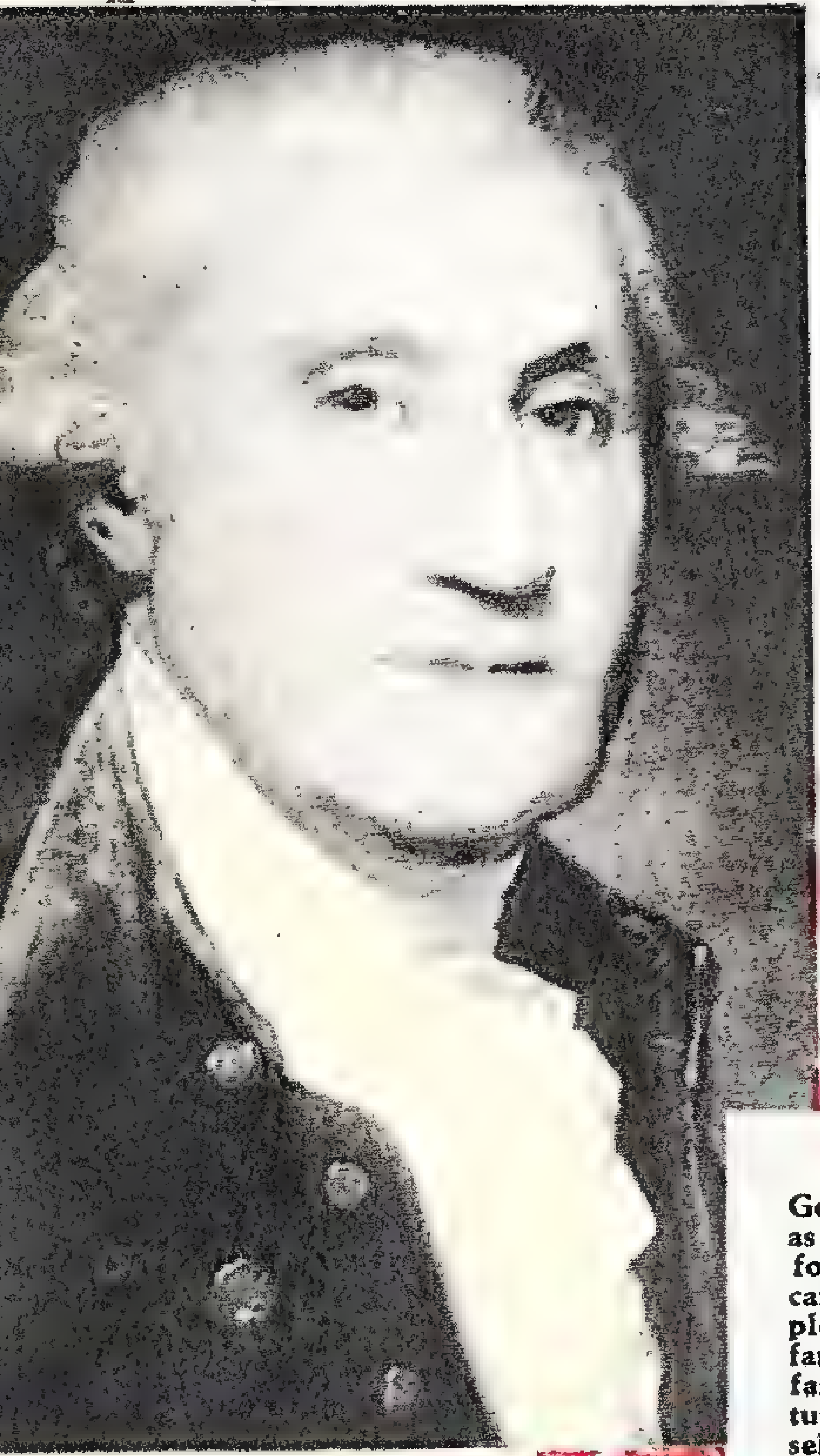
GREAT INVENTIONS

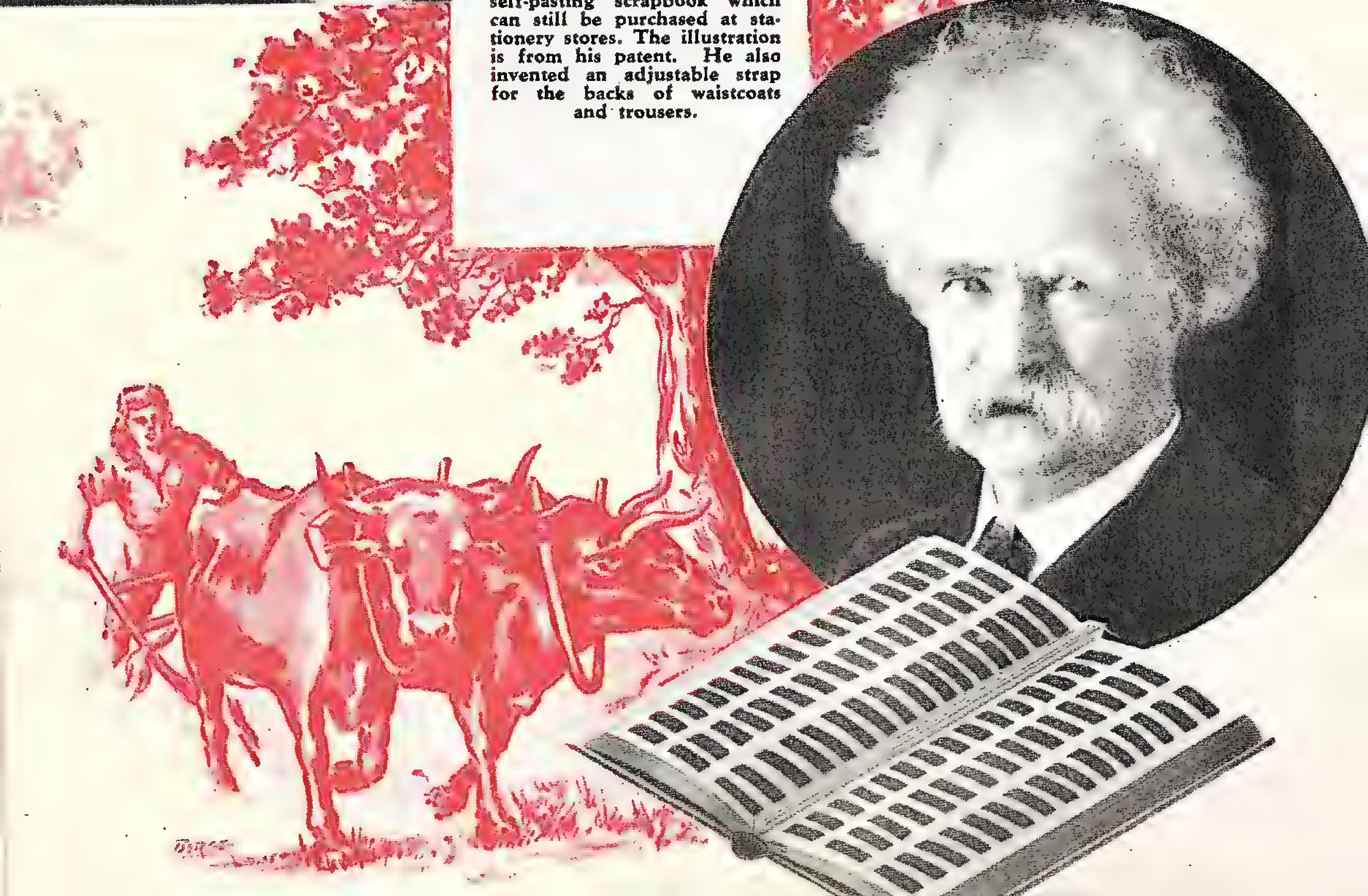
by Aubrey D. McFadyen

SENATOR WILLIAM G. McADOO'S fingers were burned at a picnic when he picked up a metal thermos bottle cap-cup full of hot coffee. So he went home and invented a heat-proof cap. The Senator's latest patent covers improvements in the familiar safety razor—the new razor being constructed so that the blade can be inserted or removed without taking the razor apart.

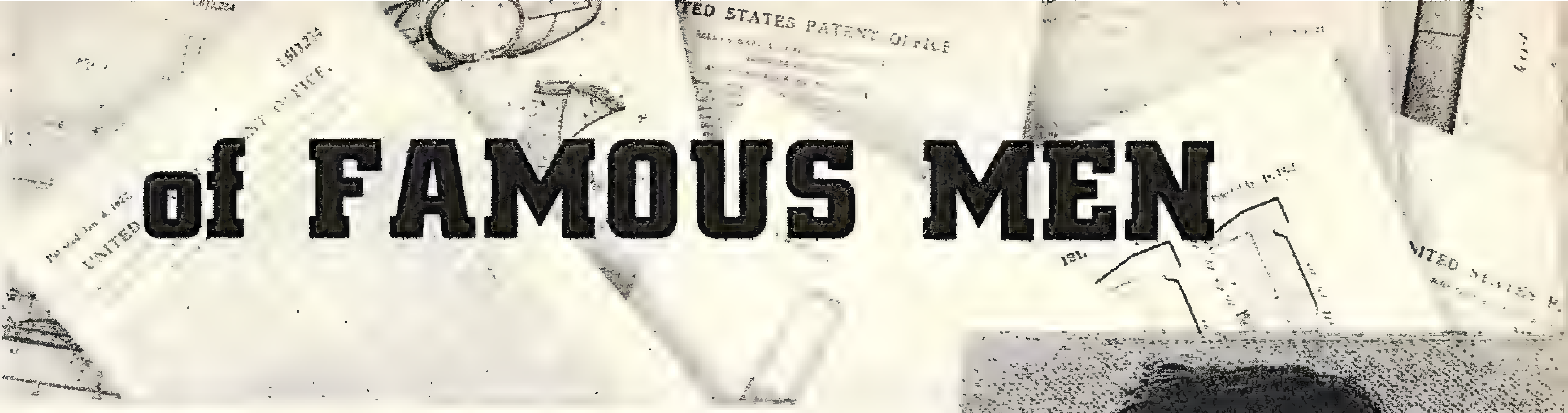
To such casual inventors the world is indebted for most of the 2,059,187 inventions patented in the United States during the 100 years existence of the American patent system, the centennial of which was observed in Washington on November 23.

Everybody, from Presidents to prisoners, has been inventing all manners of things. It excites little wonder when an eminent pianist patents numerous automobile structure, or when a pugilist patents a monkey wrench, or even when a scion of one of the nation's wealthiest families patents a shoe polishing device. The name of Dr. Albert Einstein is so much in the daily print in connection with





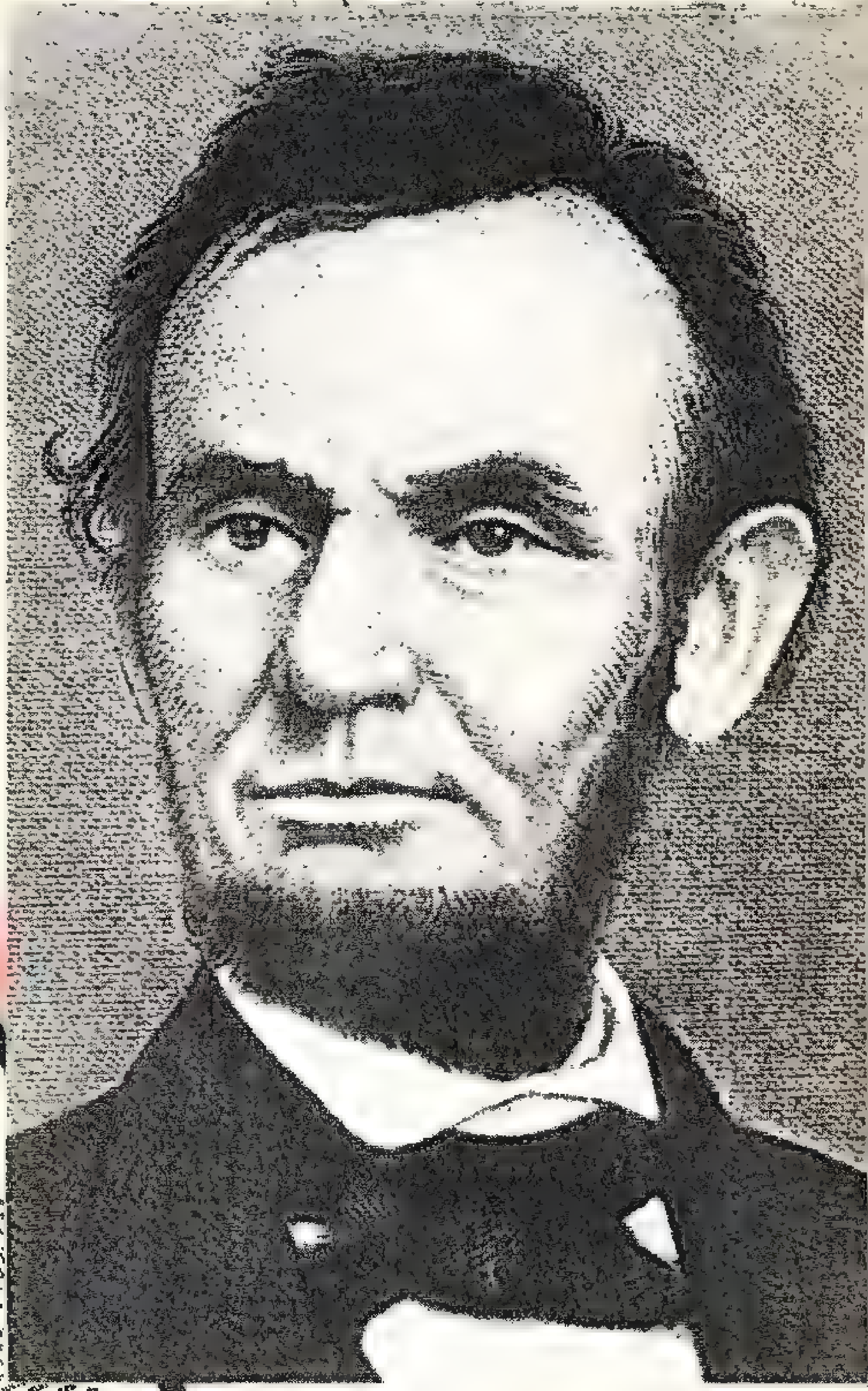
George Washington, pictured as painted by Gilbert Stuart, found time in his versatile career to invent a seeding plow, a wine coaster and other farm devices. Samuel Clemens, famed as Mark Twain, pictured at right. invented the self-pasting scrapbook which can still be purchased at stationery stores. The illustration is from his patent. He also invented an adjustable strap for the backs of waistcoats and trousers.

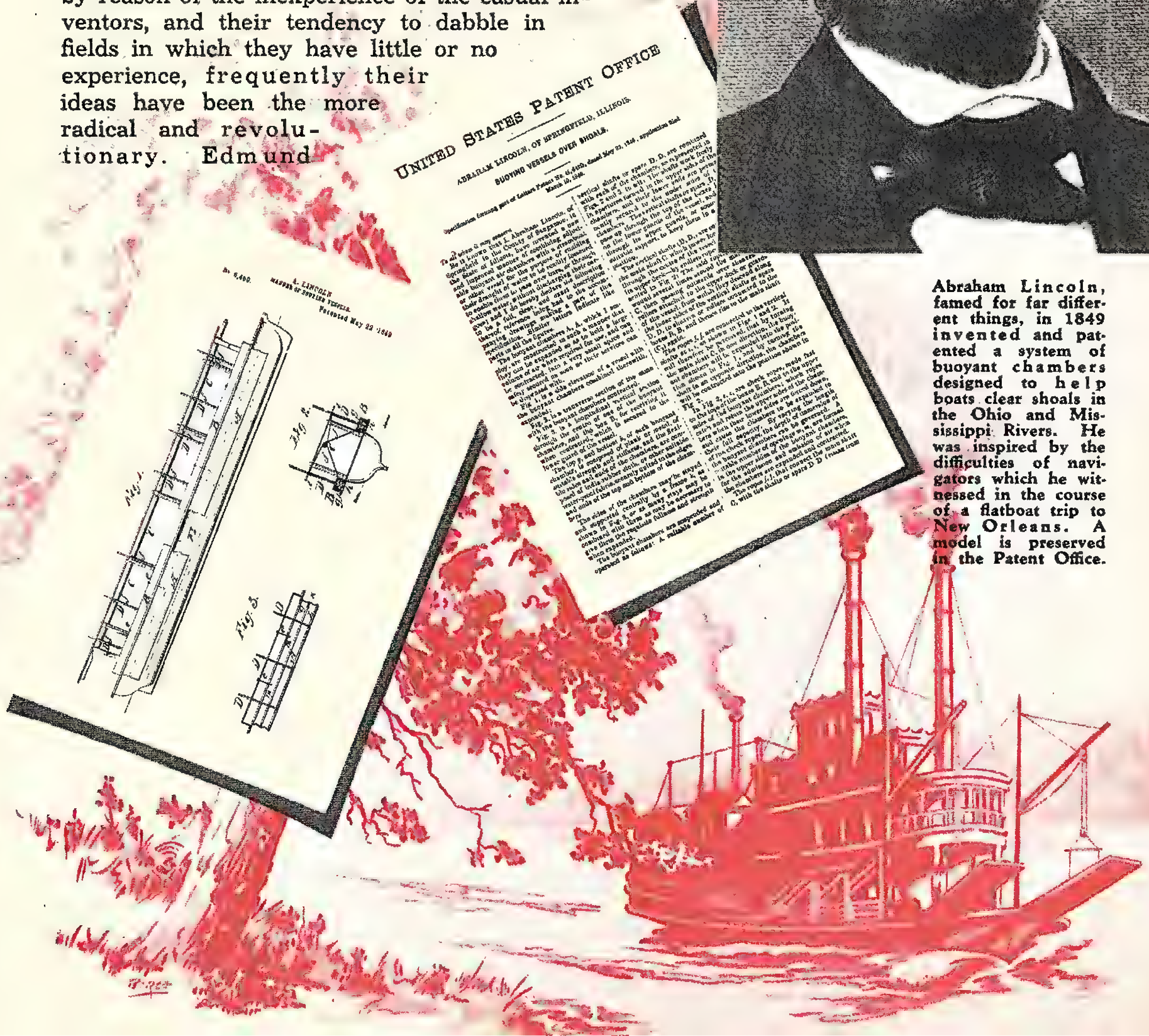


# of FAMOUS MEN

his theory of relativity that when he patents a novel refrigerating system it is not even regarded as news.

When one reads that Thomas A. Edison patented 1,101 inventions, that John F. O'Connor, Chicago railway engineer has patented 968, or that Carleton Ellis, Montclair, N. J., chemist, has patented nearly 700 inventions ,the conclusion is immediately drawn that professional inventors are the backbone of the Patent Office. Nothing is farther from the truth. Men like John F. O'Connor, Elihu Thomson, Carleton Ellis, Henry A. Wise Wood, Clyde C. Farmer, John Hays Hammond, Jr., and Ethan I. Dodds—all living inventors, each having patented over 300 inventions—are the exceptions. For every professional inventor there are hundreds of amateur or casual inventors. In fact, by reason of the inexperience of the casual inventors, and their tendency to dabble in fields in which they have little or no experience, frequently their ideas have been the more radical and revolutionary. Edmund





UNITED STATES PATENT OFFICE

ABRAHAM LINCOLN, OF SPRINGFIELD, ILLINOIS.

BUOYING VESSELS OVER SHOALS.

Specification forming part of Letters Patent No. 6,469, dated May 22, 1849, application filed March 10, 1849.

No. 6,469.
A. LINCOLN
MANNER OF BUOYING VESSELS.
Patented May 22 1849
Fig. 1.
Fig. 2.
Fig. 3.

Abraham Lincoln, famed for far different things, in 1849 invented and patented a system of buoyant chambers designed to help boats clear shoals in the Ohio and Mississippi Rivers. He was inspired by the difficulties of navigators which he witnessed in the course of a flatboat trip to New Orleans. A model is preserved in the Patent Office.

Cartwright, a clergyman and poet, invented the power loom; Eli Whitney, a New England school teacher, conceived the idea of the cotton gin while sojourning in Georgia; Richard Arkwright, a barber, invented the spinning frame; the Wright brothers, inventors of the airplane, were bicycle mechanics; Samuel Segal, inventor and founder of the lock company which bears his name, was a New York City policeman; while the automatic telephone exchange is credited to Almon B. Strowager, a Kansas City undertaker, who thought a rival had bribed telephone operators to bungle his calls!

Because of the same inexperience—many ideas of the casual inventors have not been adopted commercially. That is true, for example, of the sole invention patented by Abraham Lincoln—the original model of which is one of the few preserved by the Patent Office in Washington.

As a young man Lincoln had made the trip by flatboat down the Ohio and Mississippi rivers to New Orleans, and had noted the trouble of navigators on the shoals. After steamboats had begun to replace flatboats he conceived the idea of attaching buoyant chambers, much like huge bellows, to the sides of the boats, to be inflated or otherwise forced open by the power of the engine when the steamboat went aground on a shoal. The added buoyancy was supposed to lighten the draft of the vessel, so that it would float off the shoal.

Lincoln was not the only man to become president of the United States who did a little inventing on the side, though he was the only one to take out a patent. George Washington and Thomas Jefferson, for examples, were both inventors.

Jefferson originated the folding buggy top; also the swivel chair and the modern plowshare, to mention two still in use today. The original of another of his inventions—a writing desk with an adjustable top—is in the Smithsonian Institution at Washington. Because of Jefferson's inventive and scientific traits, the duty of passing upon applications for patent was delegated to him in the early days.

George Washington's inventions included a "wine coaster," a seeding plow, and other farm devices, all of which are

Glenn S. Warner, the veteran football coach, has patented a shoulder protector and other gridiron equipment.

William Gibbs McAdoo is an inventor as well as a Senator. He has devised a heat-proof cap for a thermos bottle and not long ago patented a safety razor improvement. Natacha Rambova, once wife of the late Rudolph Valentino, holds a patent on a combined coverlet and doll.

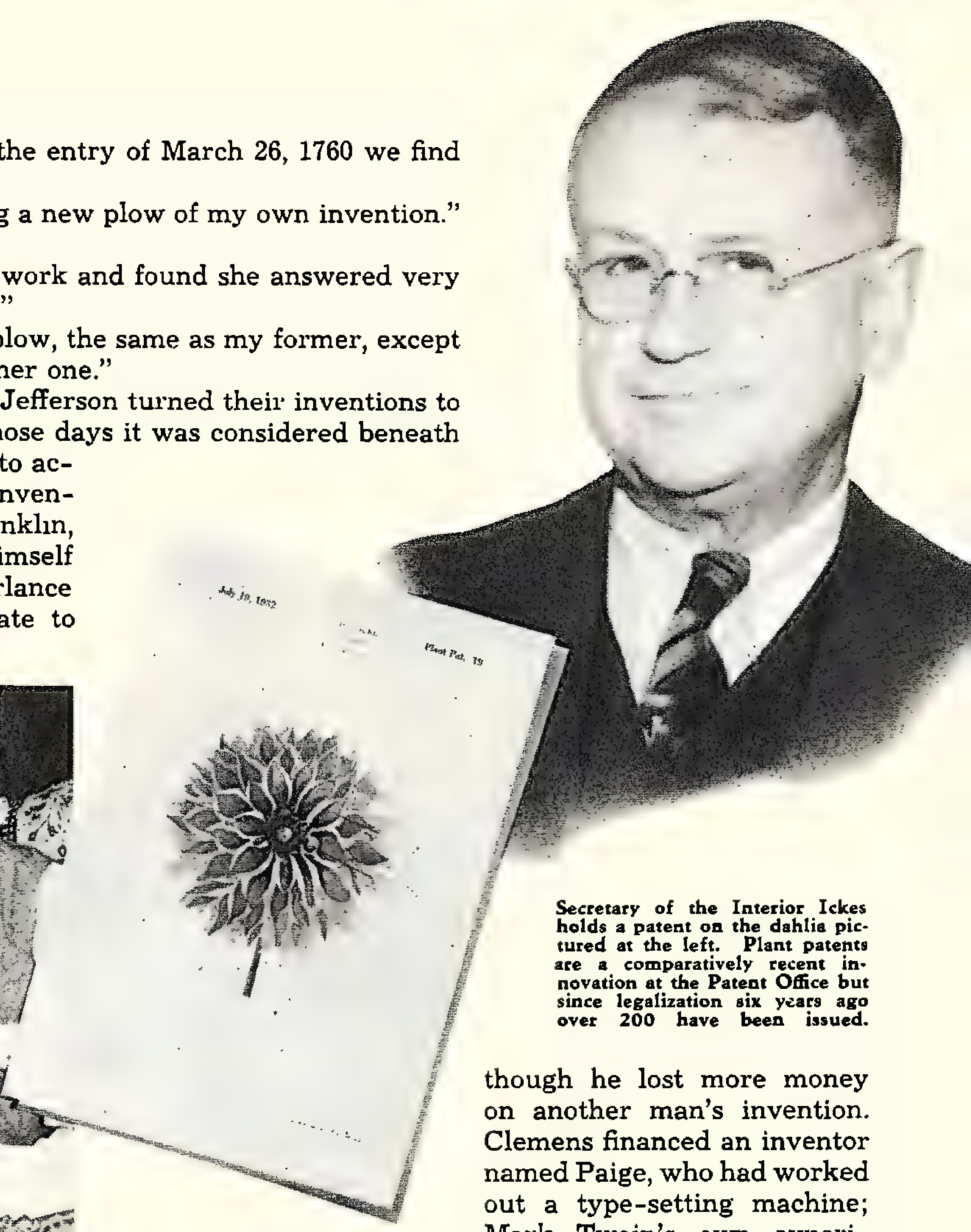
recorded in his diary. In the entry of March 26, 1760 we find this entry:

"Spent the day in making a new plow of my own invention."

Further entries read:

"March 27. Set plow to work and found she answered very well in the lower pastures."

"Apr. 5. Made another plow, the same as my former, except it has two eyes, and the other one."



Secretary of the Interior Ickes holds a patent on the dahlia pictured at the left. Plant patents are a comparatively recent innovation at the Patent Office but since legalization six years ago over 200 have been issued.

Cornelius Vanderbilt, Jr., the journalist, is recorded in the Patent Office as inventor of a shoe polishing device the size of a large fountain pen. The barrel holds the polish.

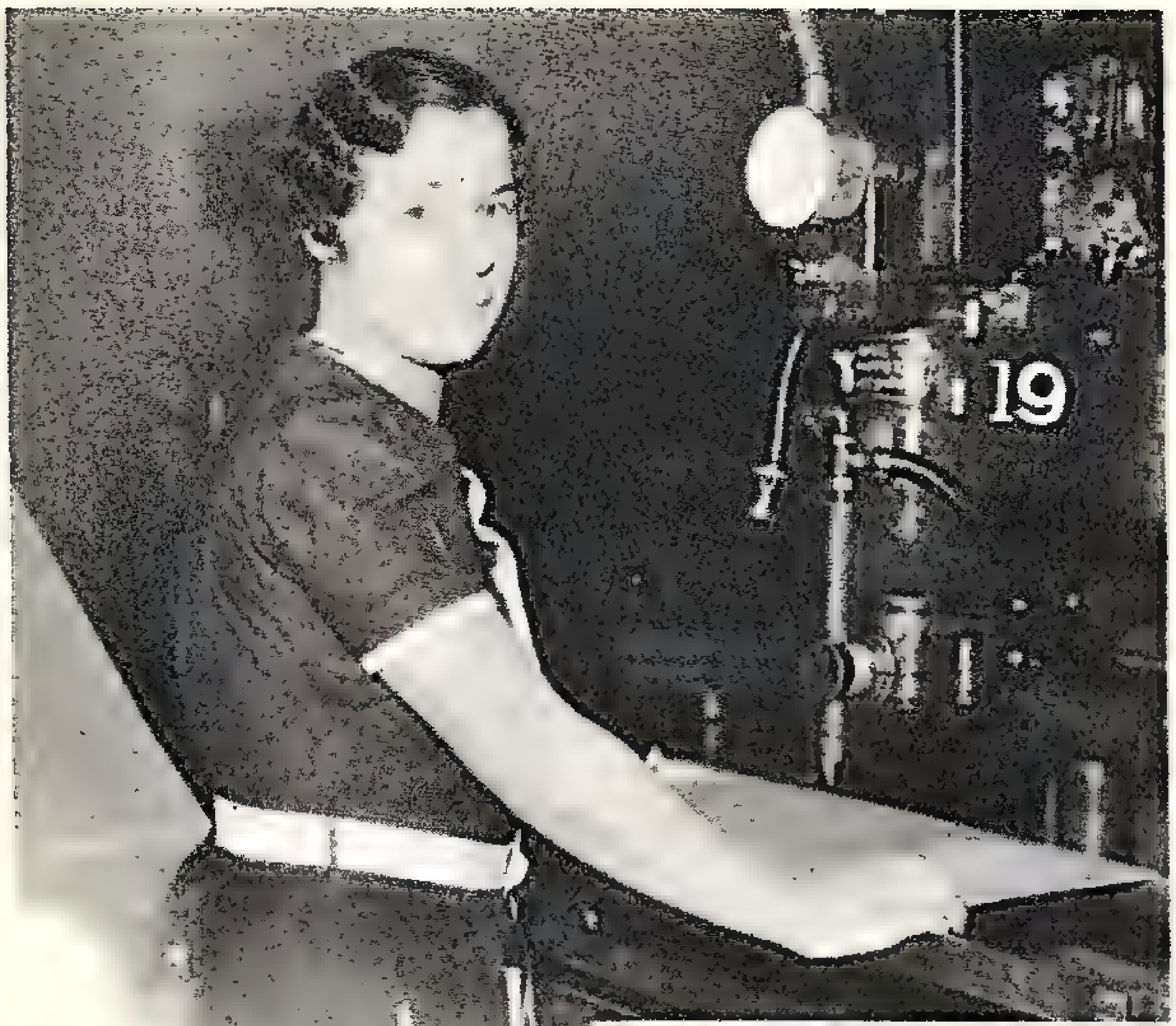
Neither Washington nor Jefferson turned their inventions to commercial account. In those days it was considered beneath the dignity of a gentleman to accept remuneration for inventive effort. Benjamin Franklin, however, not regarding himself as a "gentleman" in the parlance of the day, did not hesitate to exploit his inventions. On his copper plate press was printed the first paper money used in New Jersey. He first devised spectacles with double lenses, for reading and distance; he also invented a mangle for pressing linen, and the renowned "Franklin stove," a sort of cast iron fireplace which could be set up in the room and connected by pipe to the chimney. It was the first heater in which most of the heat did not go up the chimney.

Among the American men of letters the late Samuel L. Clemens stands among the very first in the affections of the reading public, but few know that Mark Twain was an amateur inventor, and that one, at least, of his inventions made money for him—though he lost more money on another man's invention. Clemens financed an inventor named Paige, who had worked out a type-setting machine; Mark Twain's own experiences as a printer interested him in the problem. One machine was completed at a cost of $1,300,000; it is now on exhibit at Columbia University. But before Paige's machine reached the commercial stage Ottmar Mergenthaler's much simpler and cheaper slug casting machine—the linotype—was on the market, and all of Clemens' investment—$190,000, constituting most of his wealth—was lost. Dejected, Clemens wrote to the publishers of a book intended to aid inventors: "If your book tells how to exterminate inventors, send me nine editions."

Three patents were issued to Mark Twain himself, however. The first was an adjustable and detachable strap for the backs of waistcoats and trousers. Then in 1873 Clemens took out a patent entitled, "Mark Twain's Self-Pasting Scrap Book," which can still be

[*Continued on page* 134]

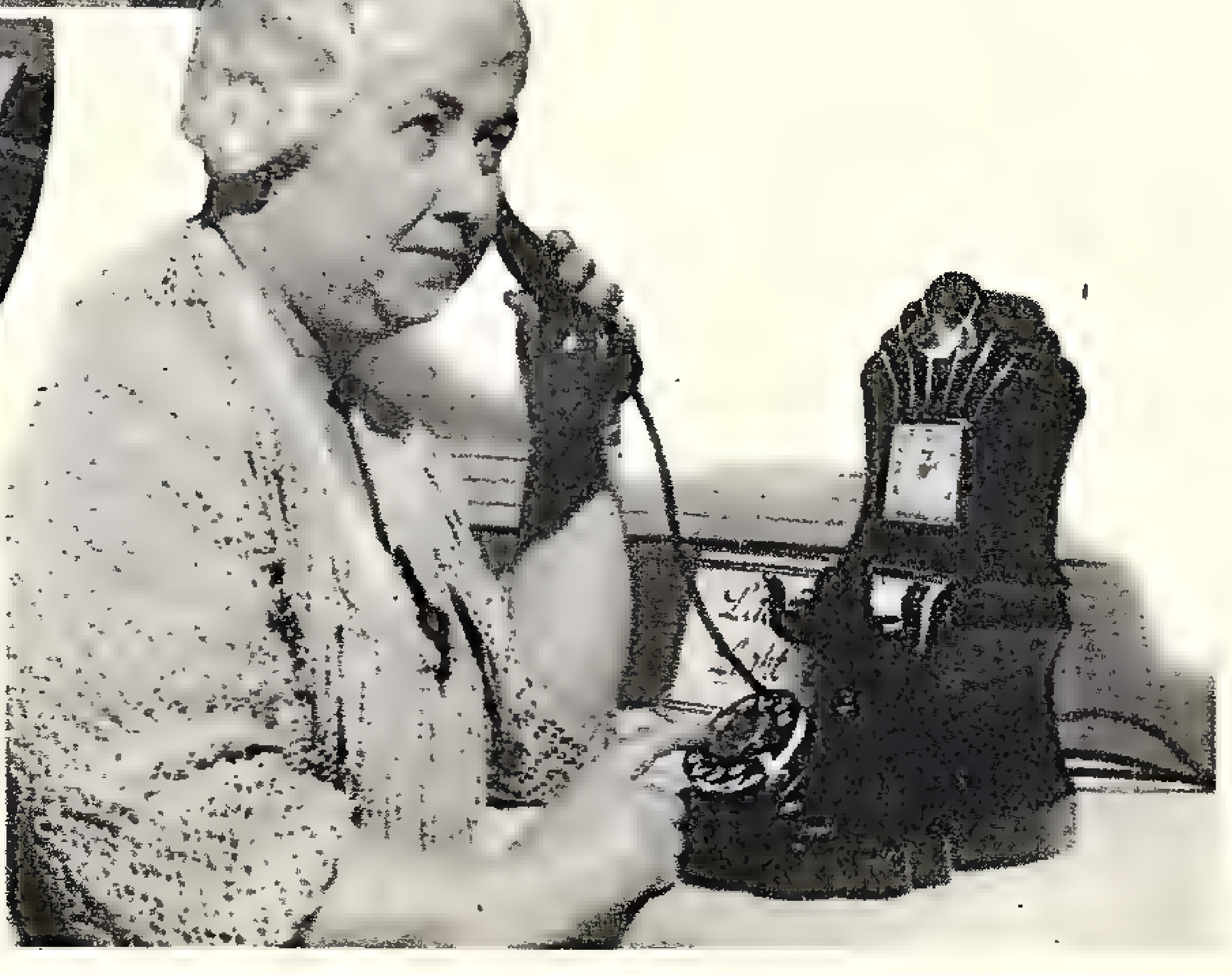
PROVING WOMEN ALSO HAVE IDEAS



Mrs. Sophie Baikusis, above, is the most inventive employee of the General Electric plant at Schenectady, N. Y. The widowed mother of two children, she has earned bonuses with 80 suggestions since she went to work in the radio department 9 years ago.

Miss Inez E. Matthews of Oakland, Calif., above, is the inventor of the "Ice Box" flower, widely marketed imitation flowers which freshen when refrigerated. The idea occurred to her while studying art in Paris. Though only 14 years old, Miss Jane Plant of College Park, left, worked as a "grease monkey" at the Candler Airport in Atlanta, Ga., during her vacation. As soon as she is old enough she plans an air career. Mrs. Mary Brusseau of Windsor, Ont., is shown below with the illumiphone which she has invented for telephones. It is a combination telephone stand of modern design which lights upon lifting of receiver. A two-way switch permits light to be turned on without lifting the receiver.

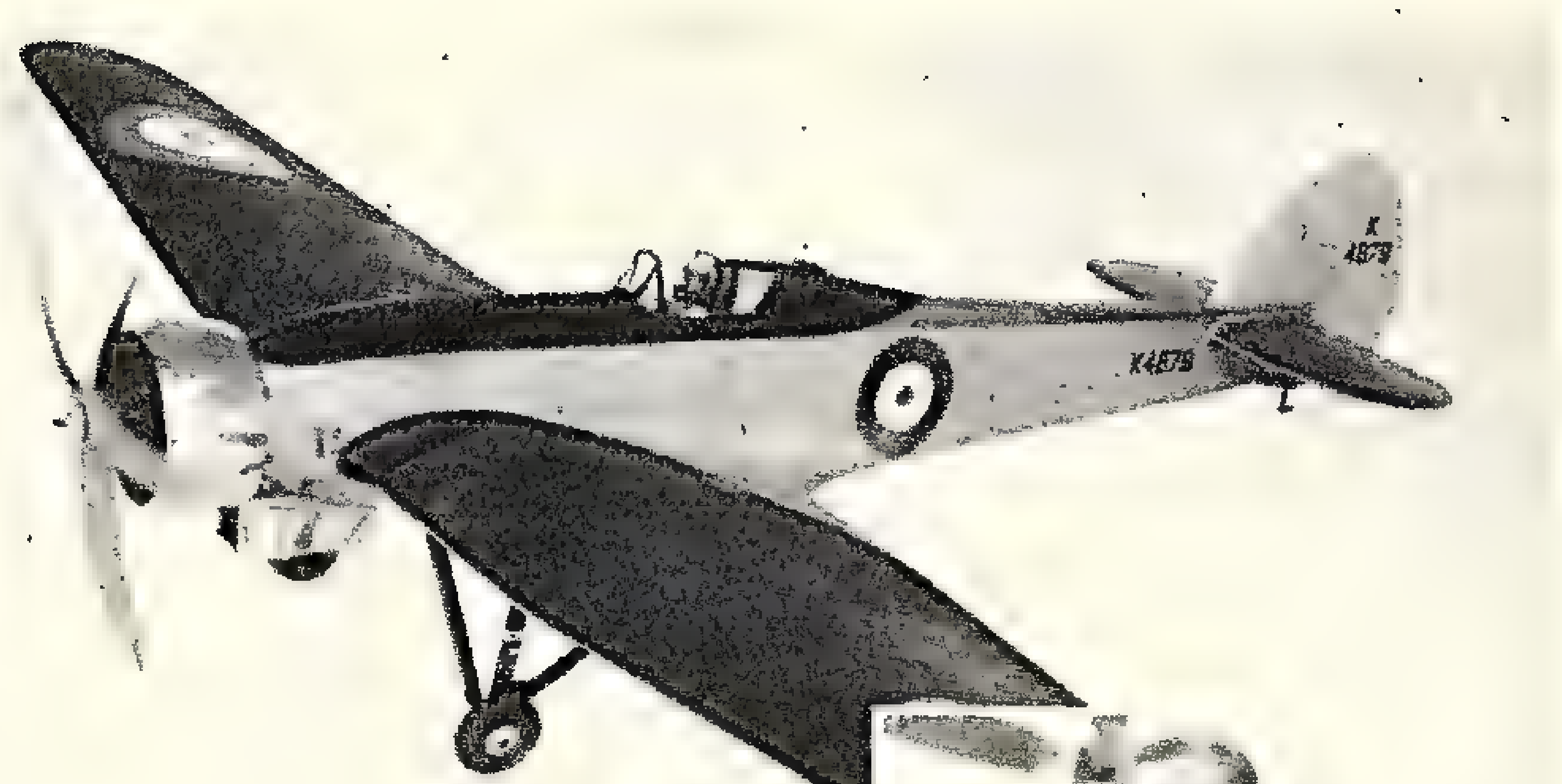
Queen of women inventors is Miss Beulah Louise Henry of New York, above. She has earned the title of "Lady Edison" with 43 patents in the past decade for inventions ranging from dolls to sewing machines. One of her most unusual products is a snap-on parasol which permits a woman to have an umbrella to match each frock. She also has devised many things for the aid of office workers.

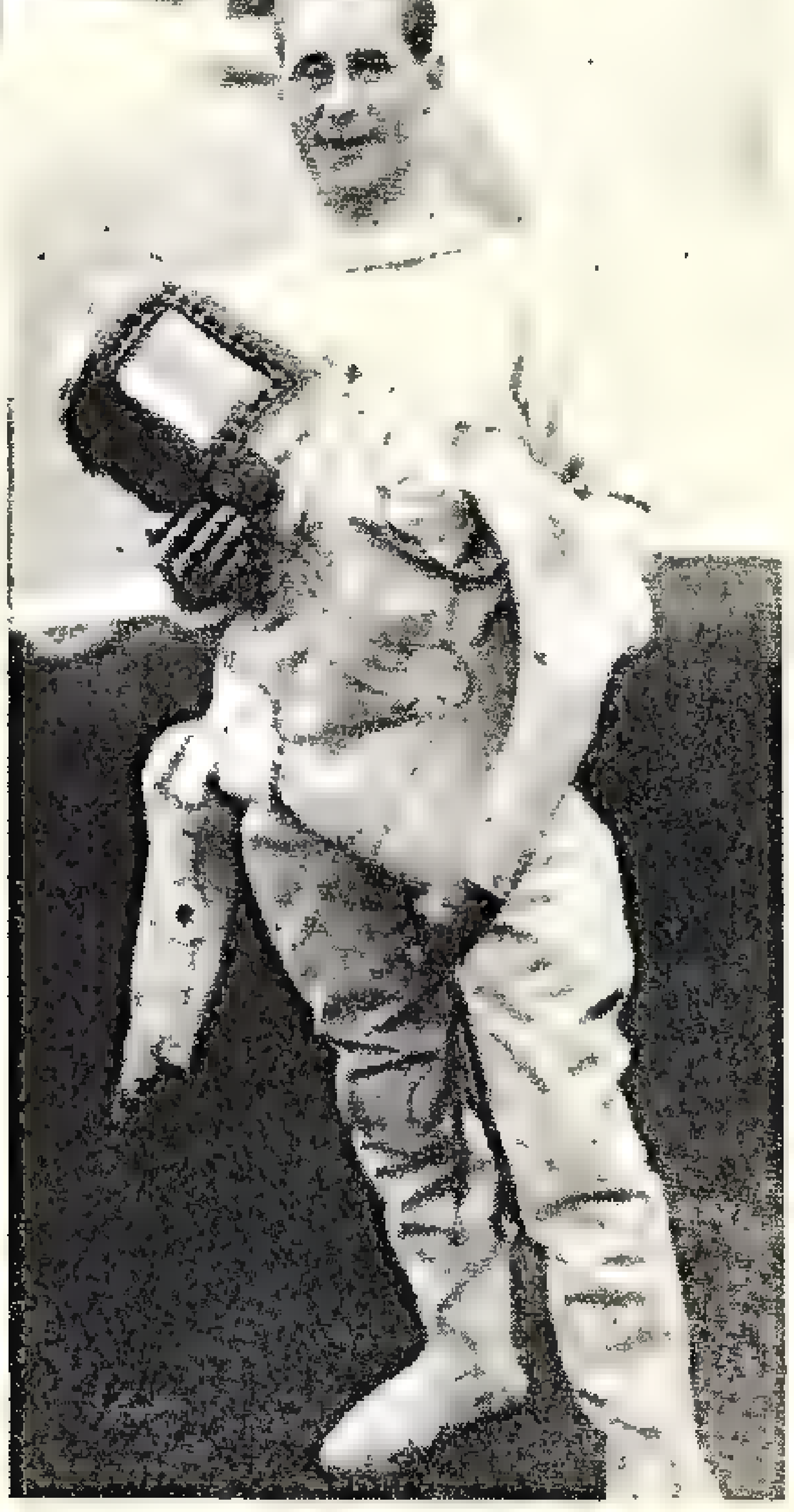


Pilot Uses Inflated Suit On Record Altitude Hop

WEARING a specially designed high altitude flying suit and piloting a Bristol 138 airplane equipped with a supercharged Pegasus engine, Squadron Leader F. R. D. Swain, of the Royal Air Force, established a new world's altitude record of 49,967 feet at Farnborough, Hants, in England.

The flying suit worn by pilot Swain consisted of a rubberized fabric oversuit fitted with a helmet of the same material in which a curved double-glass window was fixed. The suit, when inflated, was designed to maintain normal atmospheric pressure on the lungs of the wearer regardless of altitude. Squadron Leader Swain was complimented by King Edward VIII, for setting a world's record. It was necessary for him to surpass the French altitude record of 48,698 feet by a margin of at least 984 feet to obtain recognition of his new record.





Above—The figure in the airplane is not a robot pilot despite its mechanical appearance. It is Squadron Leader F. R. D. Swain returning from the altitude flight in which he attained a height of 49,967 feet, establishing a new world's record. Pilot Swain is wearing the specially designed inflated flying suit that helped maintain normal atmospheric pressure on his body despite altitude. Right—A close-up of Squadron Leader Swain and rubberized oversuit he wore on the flight.

Pullman Cars Go Modernistic

The new Pullman observation cars are roomy and comfortable. Steel alloy bodies and aluminum alloy interiors, comfortable seats, venetian blinds, and indirect lighting are featured.

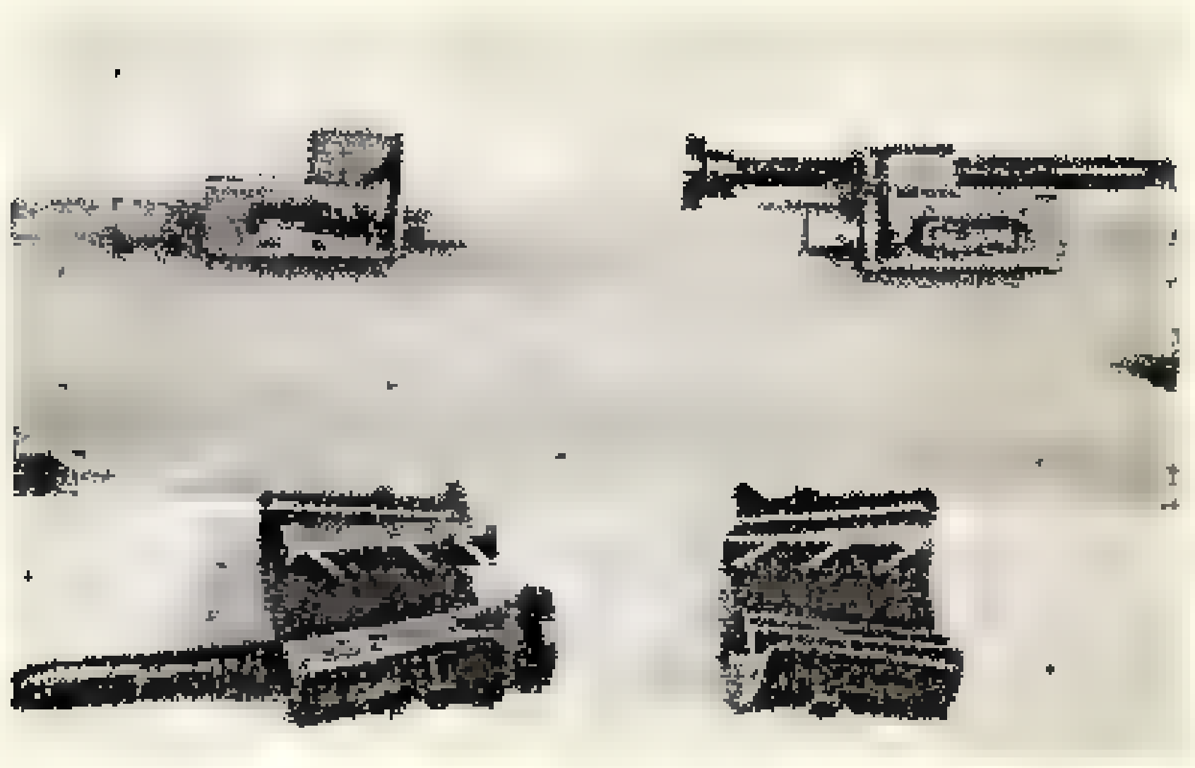
COMFORTABLE modernistic furniture and indirect lighting for night reading purposes are features of the new steel and aluminum alloy Pullman observation cars. A buffet containing a broiler, coffee urn, and a refrigerator is also featured.

An observation parlor seating six persons is located at the rear round-end of the car, and a lounge seating 20 persons on sofas and seats occupies the remaining car space.

Saddle Clamp Is Removable

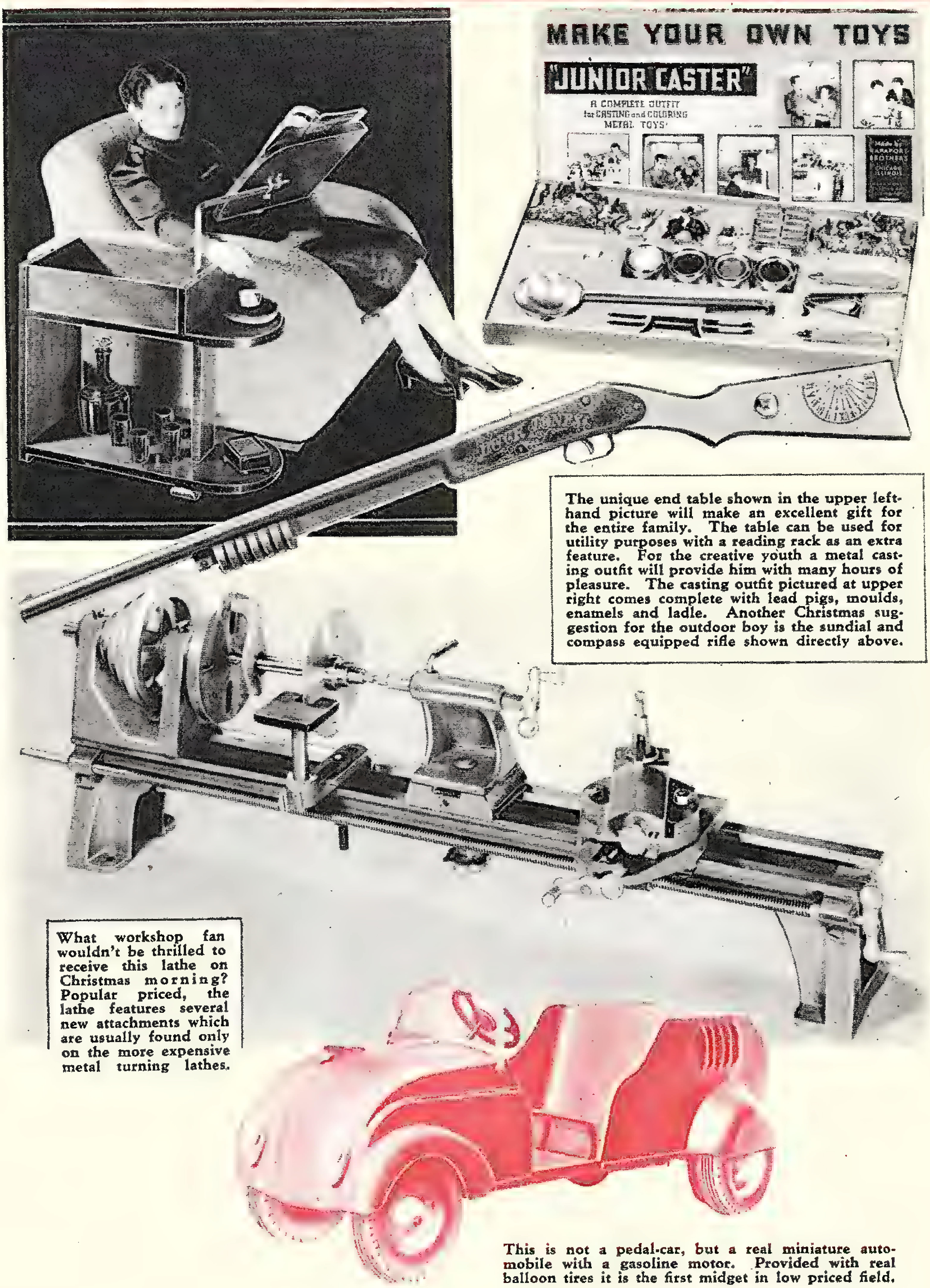
COMPOSED of two saddles, each drilled and tapped for a feed screw, a removable workshop clamp has been developed by C. P. Stuart, of Gorham, New Hampshire. Each saddle has two wedged shape jaws with three diagonal teeth that bite into the wood or metal beam to which the clamp is to be attached.

Each of the wedges has a pawl attached to its backside which engage teeth in the side of the saddle. This maintains the saddle in position while being used. The pawls can be turned half around enabling the user to remove the clamp after stress is removed by simply bumping the back of clamp.



This removable saddle-clamp device can be used two ways—as a clamp for holding work together, or as a jack to force work apart.

Last Minute Gift Suggestions



The unique end table shown in the upper left-hand picture will make an excellent gift for the entire family. The table can be used for utility purposes with a reading rack as an extra feature. For the creative youth a metal casting outfit will provide him with many hours of pleasure. The casting outfit pictured at upper right comes complete with lead pigs, moulds, enamels and ladle. Another Christmas suggestion for the outdoor boy is the sundial and compass equipped rifle shown directly above.

What workshop fan wouldn't be thrilled to receive this lathe on Christmas morning? Popular priced, the lathe features several new attachments which are usually found only on the more expensive metal turning lathes.

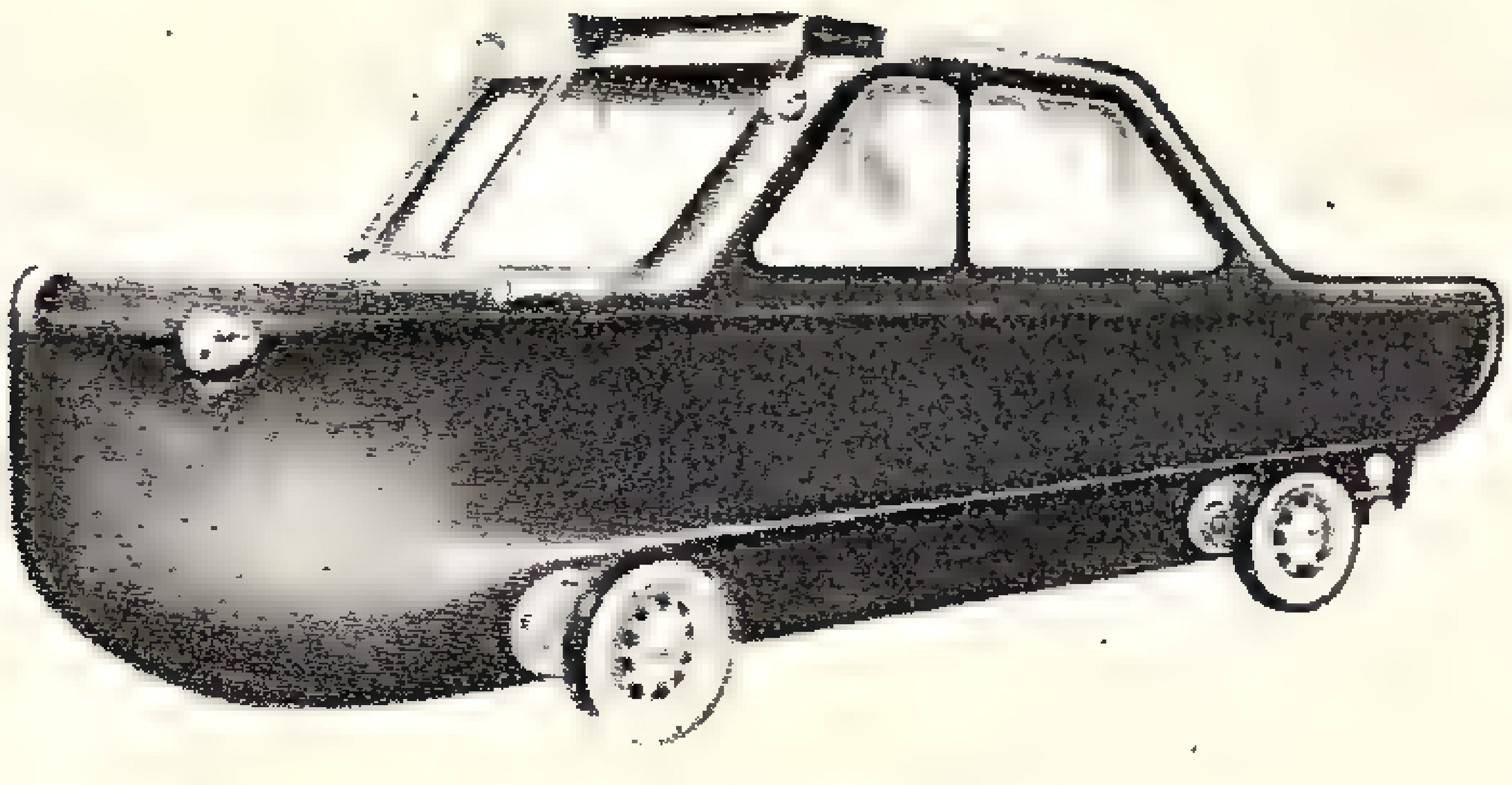
This is not a pedal-car, but a real miniature automobile with a gasoline motor. Provided with real balloon tires it is the first midget in low priced field.

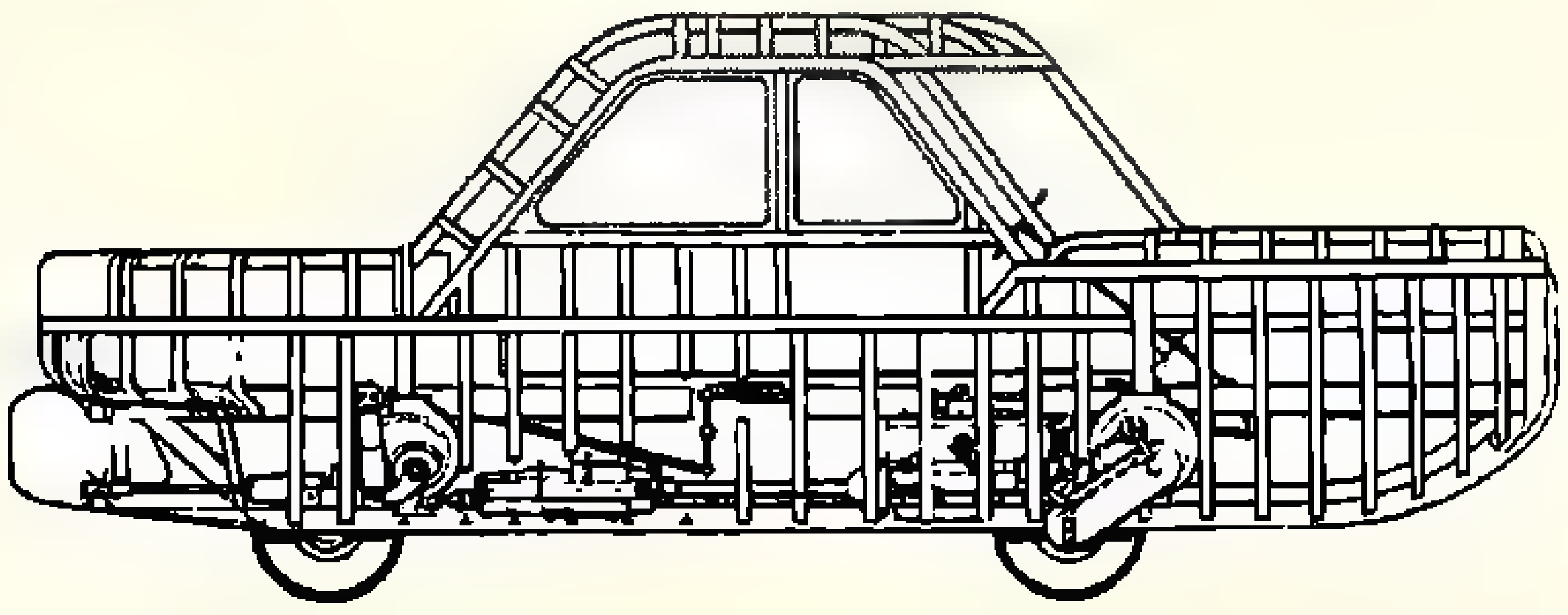
Auto-Yacht Features Aluminum Hull Construction

POWERED by a standard automotive-marine type engine, an aluminum Auto-Yacht has been invented by Roy Applegate, of San Francisco, Calif. Its construction combines a home, auto, and yacht.

The cabin is furnished like an apartment with sink, electric cooking stove, radio, electric refrigeration, etc. The windows are non-shatterable and can be made water-tight by means of wing nut adjustable bolts.

All wheels steer by use of specially designed equipment and can make a perfect arc when turning. In the event of a long water cruise, the wheel assembly can be easily removed and replaced with plain smooth plates. Twin screw propellers motivate the Auto-Yacht when used in the water.





Top-The Auto-Yacht invented by Roy Applegate of San Francisco, Calif Built mainly of lightweight aluminum it incorporates the advantages of auto and boat. Bottom—Plan view.

Blow Torch Thaws Switch

Developed in cooperation with the U. S. Forest Service this gasoline blow torch has an overall length of 41 inches. It is used to destroy weeds along tracks and to thaw frozen switches.

THAWING frozen railroad switches is quickly accomplished with a new blow torch developed by Turner Brass Works, Sycamore, Ill. The device shoots a hot blue flame downward at the ground for 2½ hours on a tankful of gasoline.

Machine Aids Beet Farmers

WEIGHING 3,000 pounds, a new machine developed by John Devey, Jr., of Glendale, Calif., may revolutionize beet farming. In one operation the new machine slices the tops from the beets and digs them from the ground at a speed that is 60 times faster than the job can be done by hand workers. Neatly topped, the beets are laid on the ground ready for loading.

The application of the device to beet farming is expected to reduce the farmer's production cost inasmuch as fewer hired hands will be needed to harvest the usual crop. It will also shorten the farmer's work day.

This beet farming machine slices tops off beets and digs them from ground 60 times faster than can be done by hand labor. John Devey, Jr., of Glendale, Calif., invented the device.

AROUND the WORLD

by H. R. Ekins

First Man to Circle Globe Via Air Lines

IT TOOK a flight around the world, entirely by air, to bring home to me the tremendous strides made by commercial aviation in the last ten years. For me the journey of little more than 18½ days, during which I flew a route of approximately 26,000 miles, was a study in aviation as it is today compared to what it was only a few years ago.

On my journey I used eight aircraft in all. The first was the German dirigible Hindenburg, the latest development in the science of lighter-than-air craft. The designers, builders and operators of the Hindenburg expect, however, that soon it will be surpassed by new giant ships of the air.

The other seven aircraft were of the heavier-than-air type. Three were used in the United States. They were twin-motored Boeings of the United Airlines and Douglas DC-2's of TWA—Transcontinental and Western Airways. The three planes which took me all the way from Frankfort, Germany, to Manila were made by Douglas, and the long trans-Pacific hop was aboard Pan-American Airways' "Hawaii Clipper," the big four-motored flying boat built by Martin and powered by Pratt and Whitney.

The aircraft listed above are the most modern and most efficient available to the civilian traveler. The study in contrasts, in-

By AIR

sofar as airplanes were concerned, began at Frankfort when I boarded a big Douglas airplane operated by KLM—Royal Dutch Airlines.

Six years ago, when I was flying around the Far East as a war correspondent for the United Press, the most powerful of the air-cooled radial engines of the Wright Cyclone type, were rated at about 525 horsepower.

In 1930 it was believed, on the basis of experience and research with the material then available, that it would be decidedly impractical to build an engine rated at more than 600 horsepower and still maintain even a vestige of dependability. Dependability in those days meant an engine that would operate for 250 hours between routine overhauls. By 1931 the power of the Wright Cyclone was increased to 575 horsepower by using slightly larger cylinders to obtain increased cubic inch displacement. During the same year advances in metallurgy and knowledge led engineers to believe that they had underestimated the possibilities of engines of the radial type.

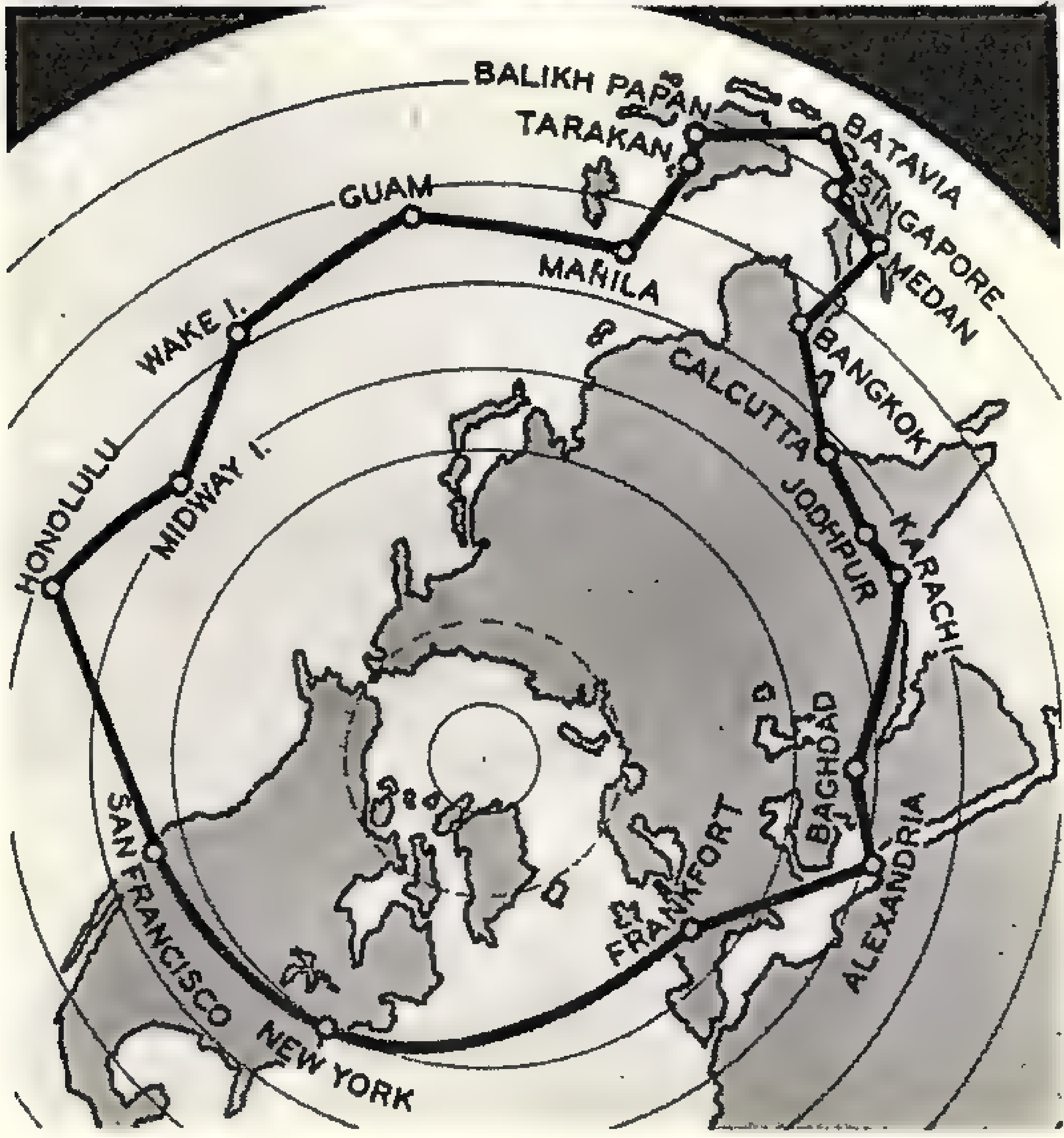
To jump a bit to the advances which had been made by the time I was ready to take off from Frankfort for the Orient I should like to point out the following:

All the way from Frankfort, Germany, to Batavia, Java, flying in only two planes, I flew behind 890 horsepower F-50 Cyclone engines. The plane of the Royal Netherlands-Indies Airways, which took me from Batavia, Java, to Manila, was powered with 715-horsepower Cyclones. When TWA flew me across the continent on the last leg of the journey they used a Douglas plane,

K-L-M
KONINKLYKE LUCHTVAART MAATSCHAPPY
PH-AKK

Above—The TWA Douglas transport plane that carried Ekins part way on his round-the-globe dash. Right—Ekins being congratulated by Miss F. W. Wilkins, TWA plane hostess, upon completing his race at Newark, N. J. Below—Dutch (K-L-M) Airline Douglas transports carried Ekins from Frankfort, Germany, to Batavia, Java.

Above—The German airship, Hindenburg, over N. Y. City. Ekins started his now famous trip from Lakehurst, N. J., aboard the giant dirigible on Sept. 30. Little more than 18½ days later, he circled Lakehurst in a TWA transport plane en route to Newark, N. J., having girdled the globe.



The route followed by Ekins on his record making flight, using only commercial airlines, is graphically shown above. The safety and comfort of American airplanes was Ekins' outstanding impression of the flight.

the Sky Chief. It was powered with F-50 Cyclones of an 890-horsepower rating.

The series F engines go back to 1932 when the Wright Aeronautical Corporation announced the development of engines rated at 700 horsepower at sea level. They weighed only two-tenths of a pound per horsepower more than the one pound per horsepower weight which the late Thomas A. Edison said was ideal for an aircraft engine. The success of the Cyclone F was immediate.

Its first commercial application was in the fleet of Douglas Airliners with which TWA equipped itself in 1934. The American and Eastern Airlines followed suit. Strangely enough, most of this I learned while flying with Dutch pilots across Europe, the Near East, and India to the Far East.

While flying over scorched, monotonous deserts I learned that in 1934 the leaders of Dutch commercial aviation were following developments in America closely. KLM negotiated with TWA to purchase one of its ships. TWA had the Douglas production tied up with priority rights.

The Dutch got their ship. Cyclone powered, it was used by two KLM pilots, Parmentier and Moll, in the McRobertson London-to-Australia air derby that involved 12,000 miles of flying. They took second place in the speed race and first place in the handicap division. By the time the race was over KLM had ordered a fleet of Douglas planes, all powered with Wright Cyclones.

The performances of Cyclones in Douglas airplanes used to establish records both in this country and abroad caused the Douglas Company to standardize on the Wright Cyclone engine for airliner installation. Of

more than 150 Douglas airliners now in use only one, I believe, is powered with other than the standard engine.

It was the dependability of airplane engines that impressed me most as I flew around the world. I was actually in the air 8 days, 10 hours and 26 minutes, and to a man anxious to get home swiftly, yet safely, the matter of dependability was of utmost importance.

The motors behind which I flew in my early days as a passenger in airplanes would run dependably for only about 250 hours before overhaul. Now they will run at least 400 hours. Dutch engineers, great enthusiasts for American airplane power plants, told me that operation of 700 hours without overhaul is possible.

Several developments, I found as I flew, are responsible for the high efficiency of the mechanical facilities which enabled me to get around the world as fast as I did. They included the dynamic damper, a patented development removing all vibration from the engine. There were also improvements in cylinder head designs and better cooling which marked an important step towards increased power. In this connection we can look forward to further advances in supercharging which will allow greater power,

[*Continued on page* 150]

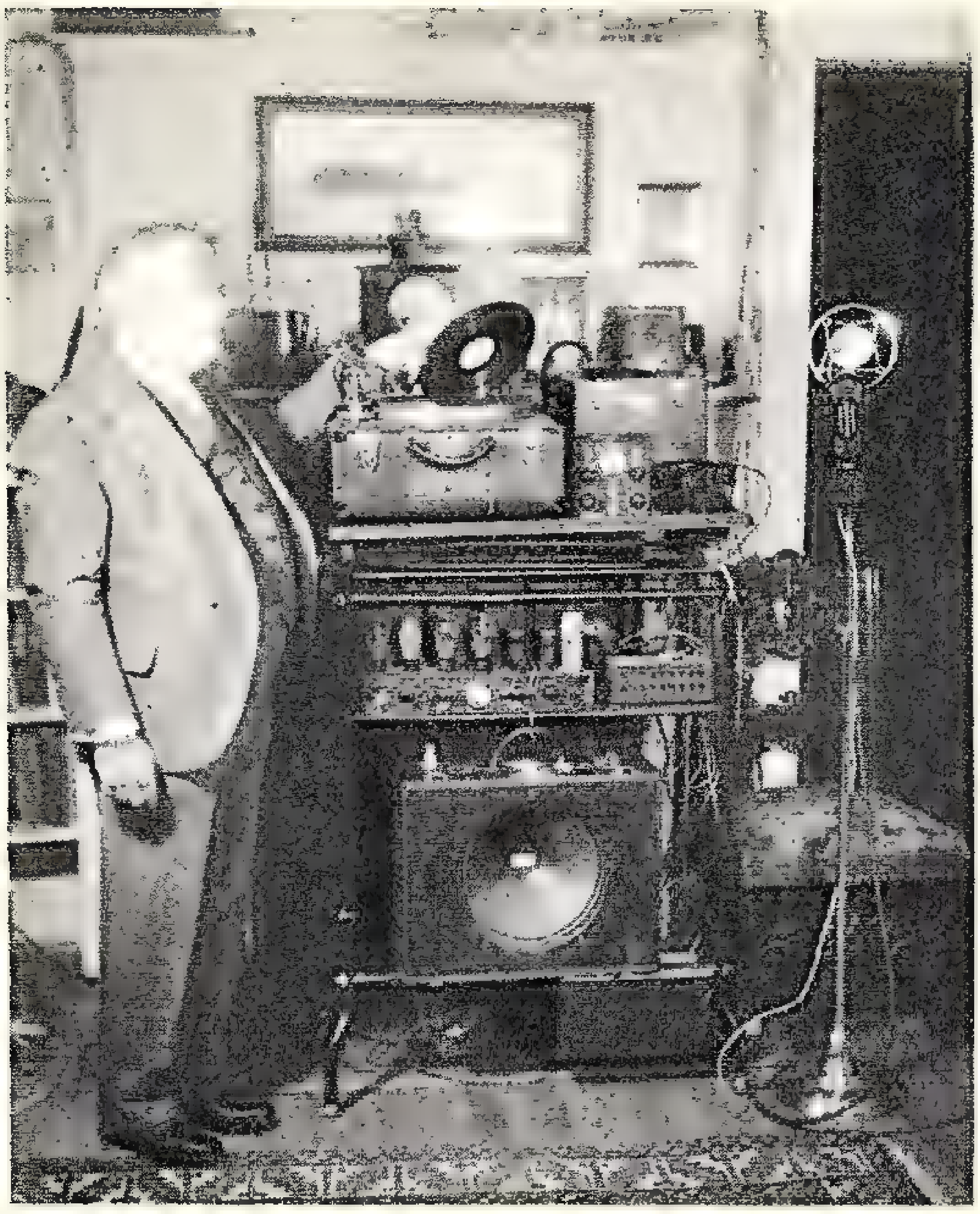
American airplanes equipped with Hamilton controllable pitch propellers like these above were instrumental in enabling Ekins to set a world's air travel record. They permit short takeoffs, maximum speed.

KLM
ATSCHAP
P

Ekins, 4,000 miles ahead of his racing rivals, shakes hands with the Dutch (K-L-M) Airline pilot who flew him from Athens, Greece, to Batavia, Java. Dutch airlines favor American airplanes and engines.

TWA
THE
LINDBERGH LINE

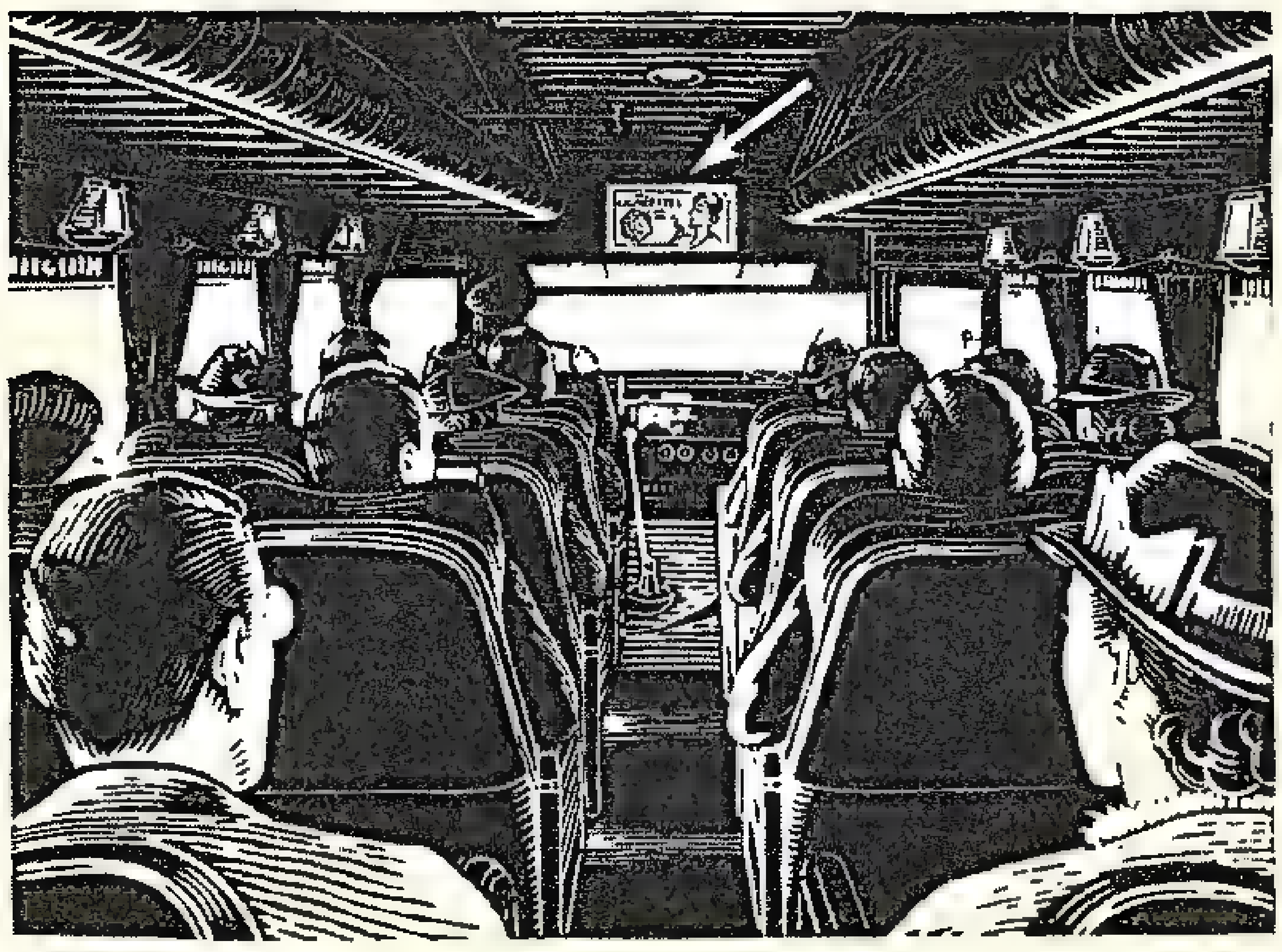
Above—Completing a flight of almost 26,000 miles in 18½ days, Ekins steps from a TWA Douglas transport at Newark, N. J., with a world's record for fast travel, using American aircraft most of the way.



A violinist can play his own accompaniment and make a phonograph record to prove the unusual feat with this device, invention of Prof. Vladimir Karapetoff of Cornell University.

Bus Ads Shown On Screen

REALIZING the need for an advertising medium in transcontinental busses, Joseph E. Houck, a San Diego, Calif., advertising man set about to design a device that would meet the special requirements of modern busses. Since placards were unsuitable, due to lack of space for mounting, he struck on the moving picture projector idea. National advertising matter photographed on Technicolor film and projected on a transparent screen was the answer. Two thousand busses will be equipped with the device.

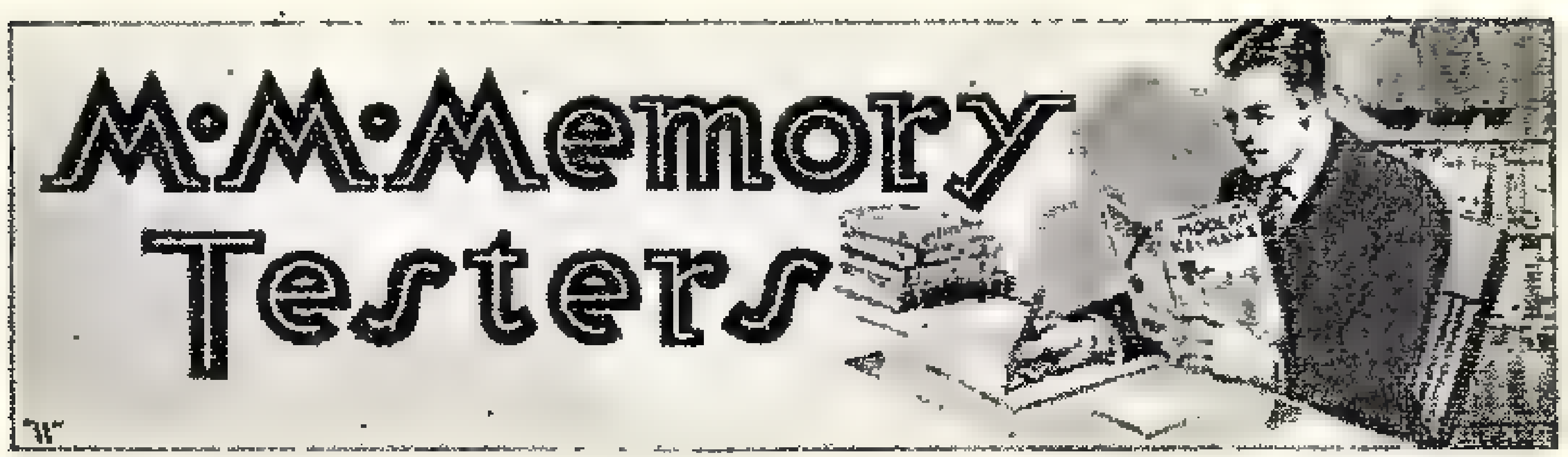


Installed over driver's seat this new advertising medium for busses projects advertising and movie scenes on a transparent rubber screen. Inventor is J. E. Houck of San Diego, Calif.

Russian Invents Double Recording Discs

A VIOLINIST playing his own piano accompaniment or a vocalist harmonizing as a trio may sound incredible, but it is quite possible according to Professor Vladimir Karapetoff of Cornell University. The eminent Russian scientist has perfected a device which makes it possible to record as many as three different instruments or voices on a single phonograph disc.

Provided with earphones, a violinist can accompany a piano rendition previously played by himself. When the recording is played back both violin and piano will harmonize. It is possible for the musician to add a third instrument to the recording, producing a stringed trio rendition. A singer who can sing alto, mezzo soprano and soprano can blend her voice into a trio when recorded on the unusual apparatus. Prof. Karapetoff's instrument uses regular home recording blank discs which are cut with a special electric pick-up. Records are played through an amplifier.



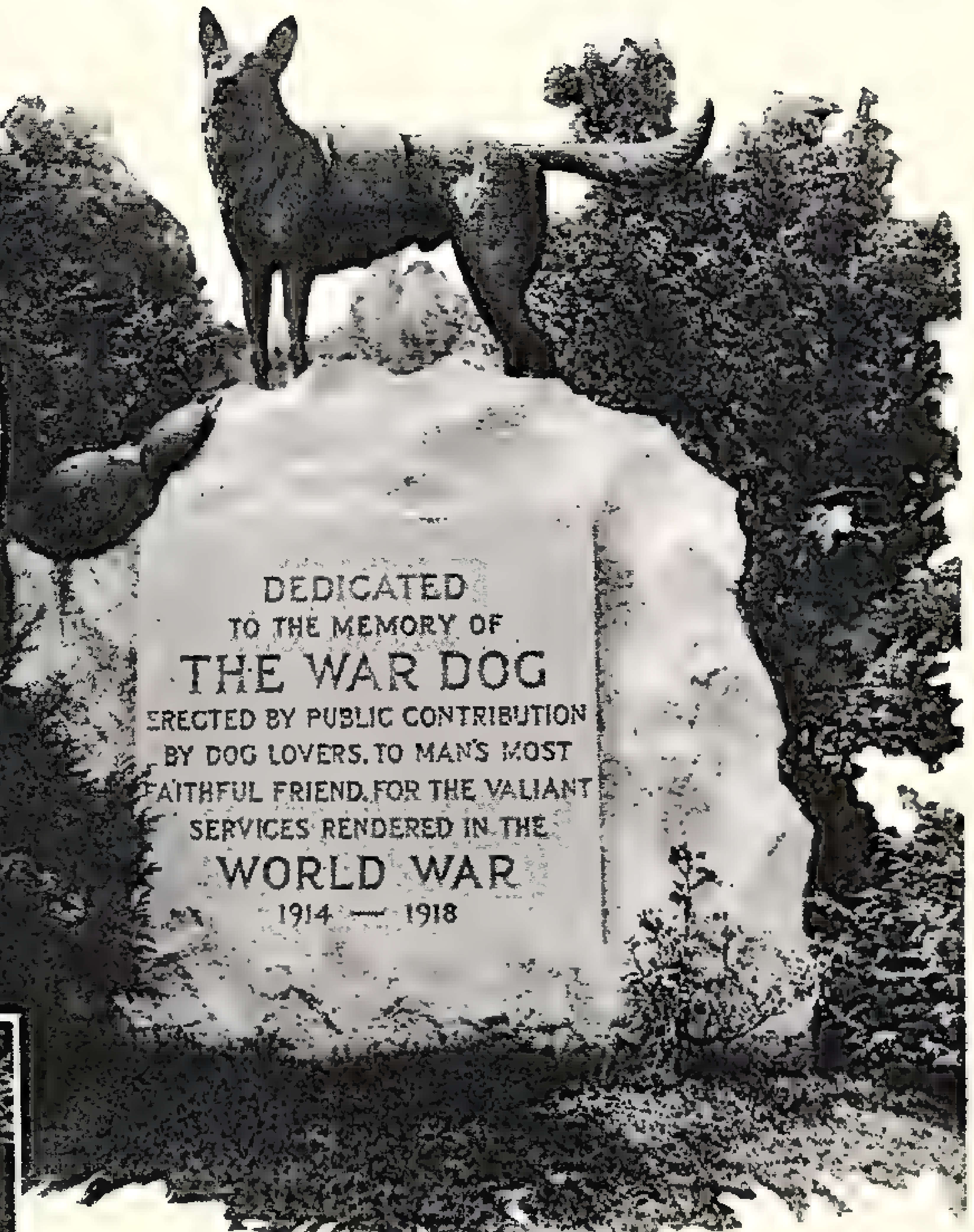
M·M·Memory Testers

How many of these questions can you answer? After testing your skill turn to page 130 for the correct answers.

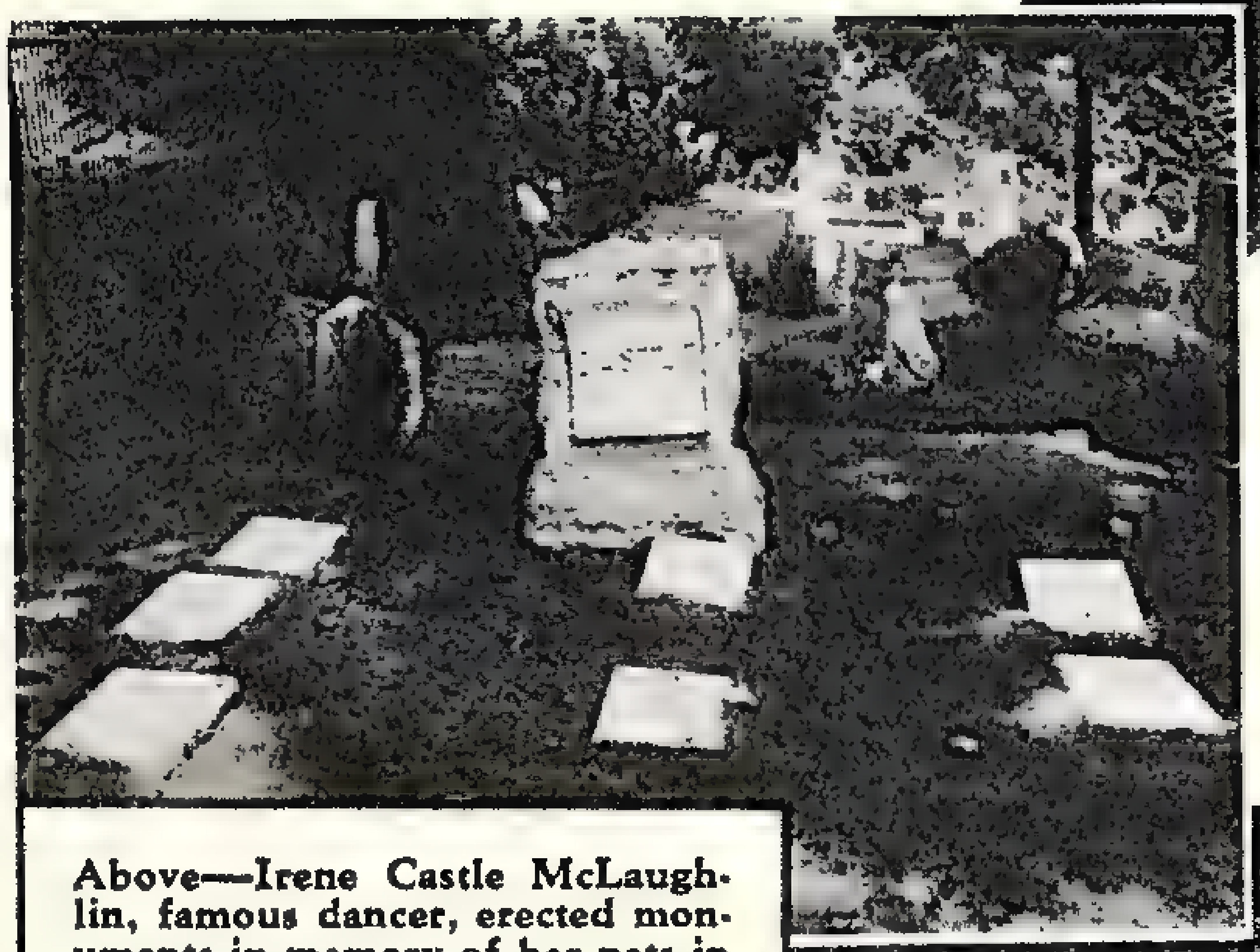
1. What purpose does a rectifier serve in an alternating current circuit?
2. Is it possible to weigh air, or doesn't it have weight?
3. What is a hydraulic ram and for what purpose is it used?
4. Name the two kinds of energy and tell the difference between the two?
5. Why are gold and silver coins produced on a punch press instead of being cast in a foundry?
6. Does sound travel faster through the air than it does over electric wires?
7. What is a Centrifuge? For what purpose is it used?
8. In what manner is the Wheatstone Bridge used in electrical work?
9. Can nickel, zinc and copper be magnetized or, if just one can be, which?
10. What holds a so-called vacuum cup to the article to which it is stuck?
11. If two strips of metal, one aluminum and the other copper, are heated simultaneously, which will expand the most?
12. Can a liquid be cooled to a temperature lower than its freezing point without having it solidify?

LOVE OF MAN FOR DOGS EXPRESSED IN BUILDING CANINE CEMETERIES

Circle—Pets of Princess Lobanoff are buried under this monument in an island dog cemetery in the Seine River, near Paris, France.


DEDICATED
TO THE MEMORY OF
THE WAR DOG
ERECTED BY PUBLIC CONTRIBUTION
BY DOG LOVERS, TO MAN'S MOST
FAITHFUL FRIEND, FOR THE VALIANT
SERVICES RENDERED IN THE
WORLD WAR
1914 — 1918

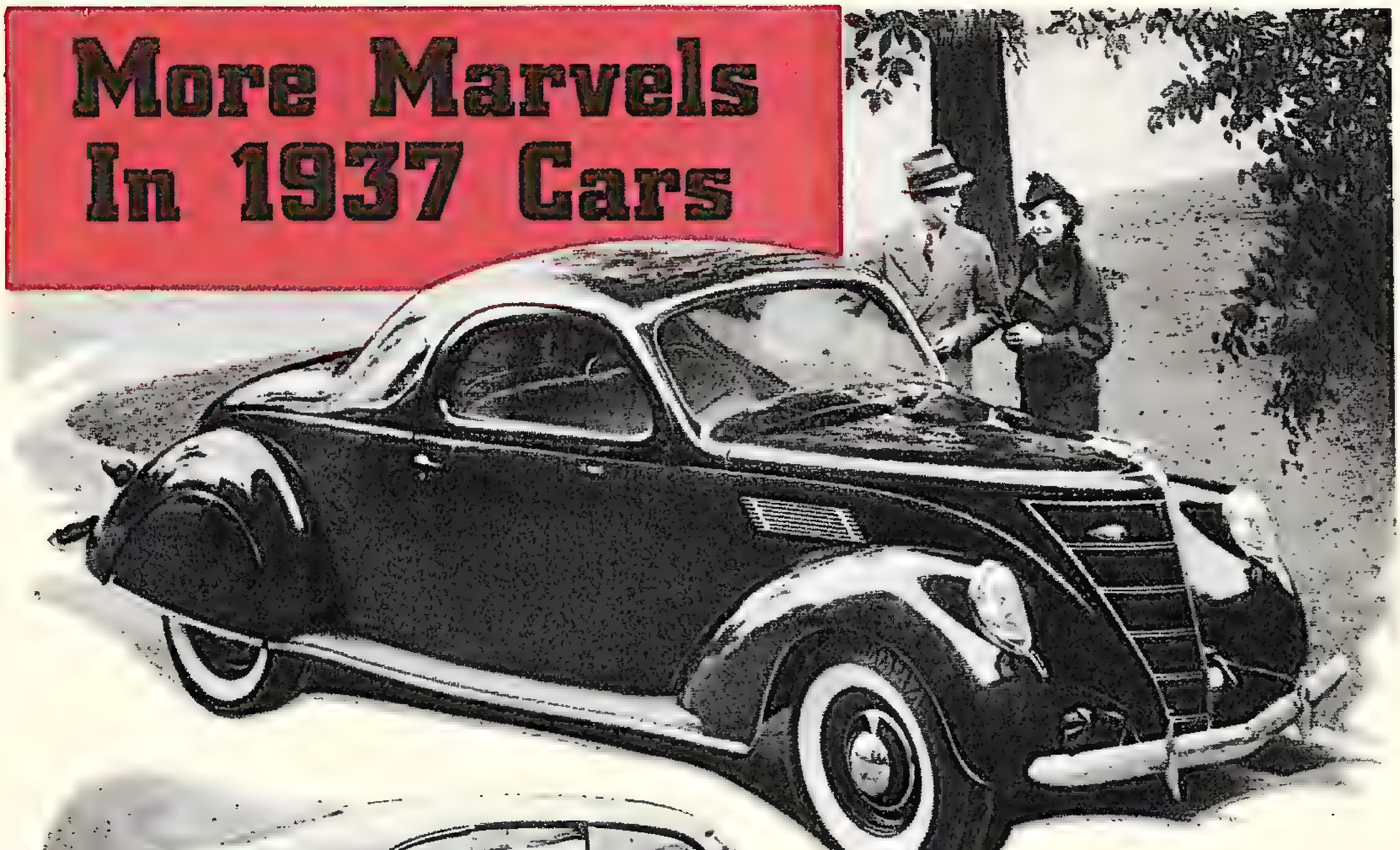
Man's gratitude for the unselfish companionship of dogs extends even to the grave. Above—A tombstone in the dog cemetery at Hartsdale, N. Y., built in memory of dogs who gave their lives in military service during the World War.



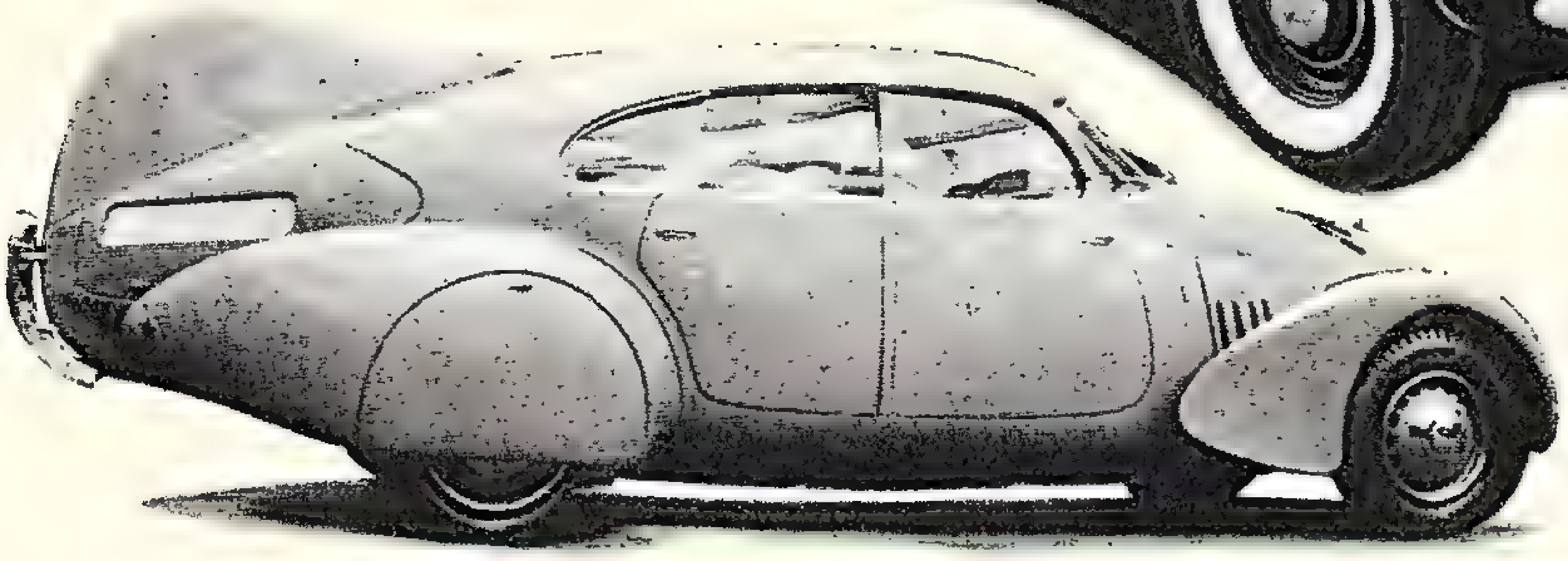
Above—Irene Castle McLaughlin, famous dancer, erected monuments in memory of her pets in the dog cemetery at Hartsdale, New York. Below—Pine Ridge Dog Cemetery, Dedham, Mass.

Above—Love of dogs who endeared themselves to their masters is universal. Here are two Japanese dog lovers visiting the grave of their pet at one of Tokyo's three dog cemeteries.

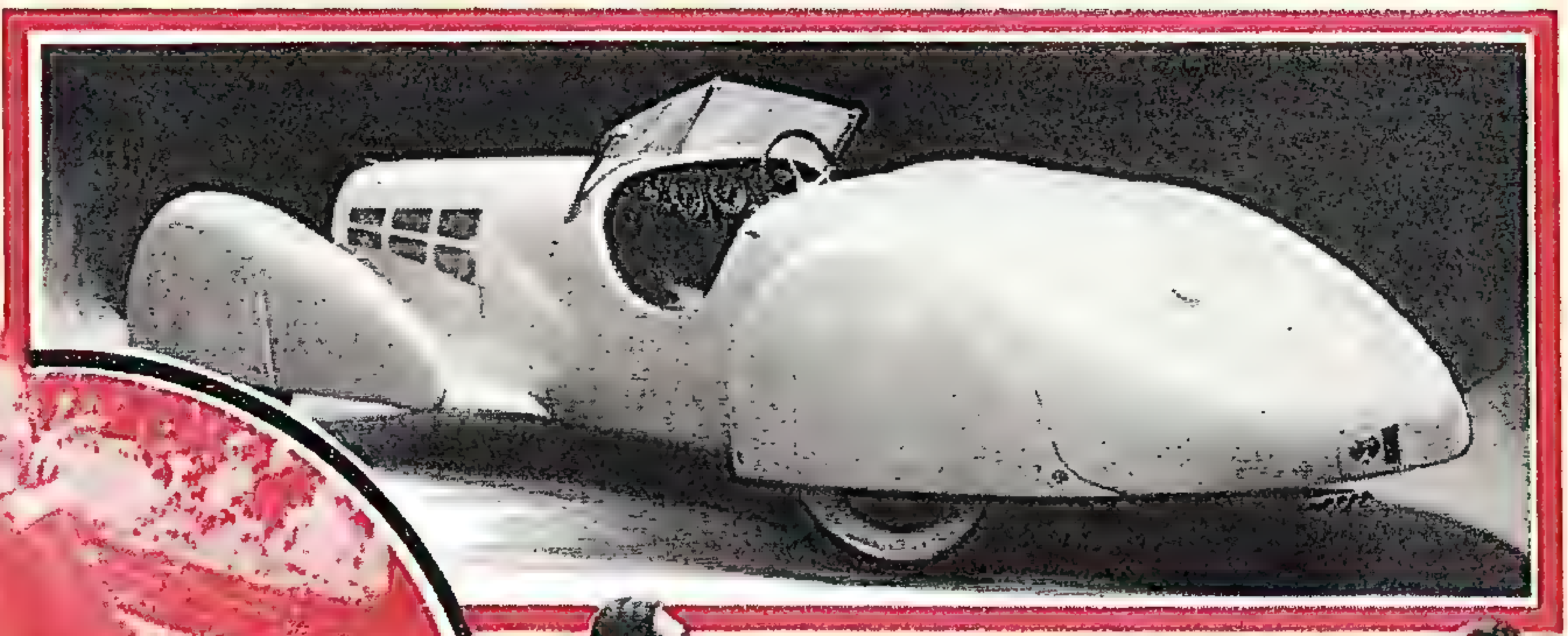
More Marvels In 1937 Cars



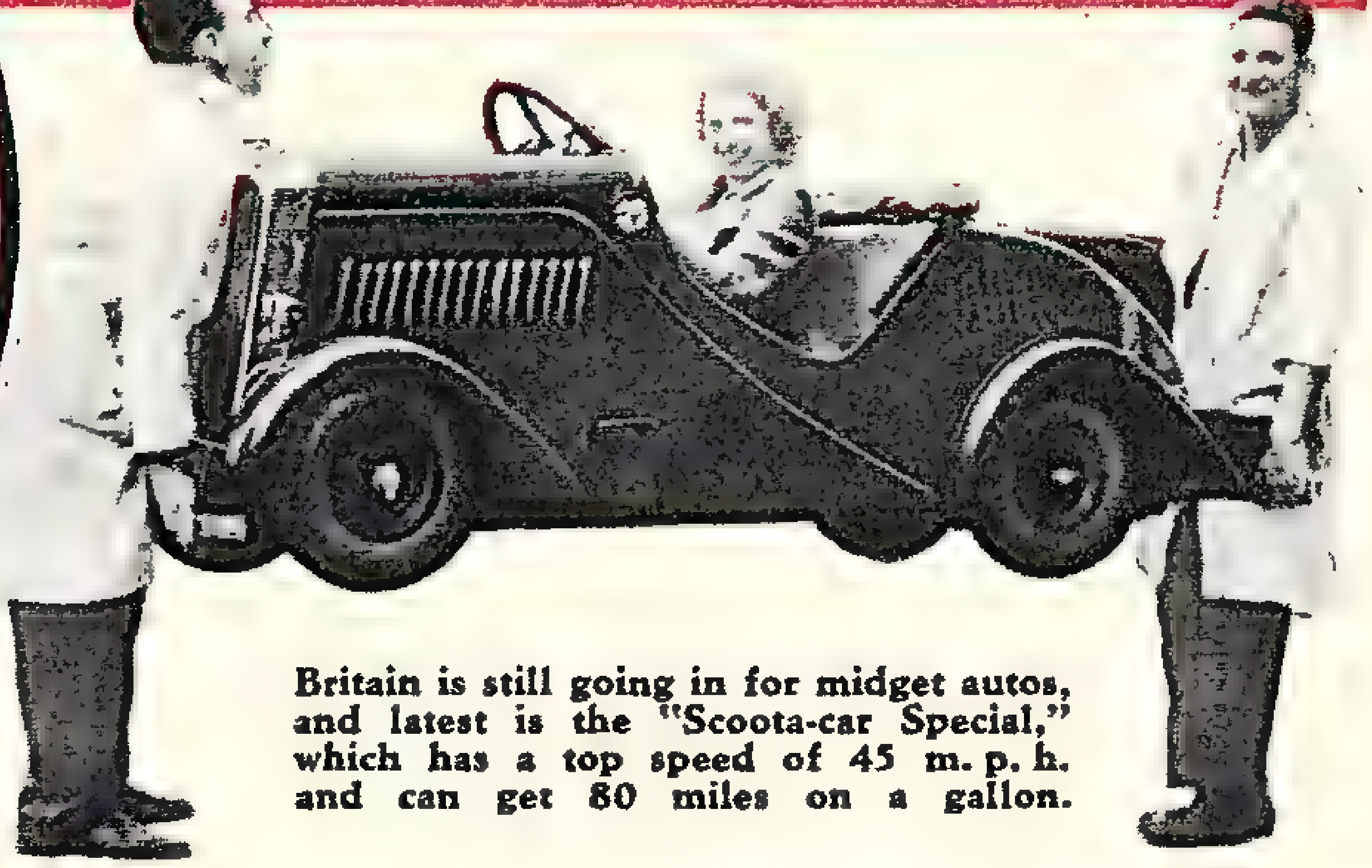
Lincoln's first Zephyr type coupe has striking lines modifying the air-stream upper body of last year's six-passenger cars. The coupe's single seat is amply wide for three passengers.



Resembling the latest planes, France's Peugot, above, attracted wide attention at the Paris show; also featuring an aerodynamic design was Italy's Bugatti, right.



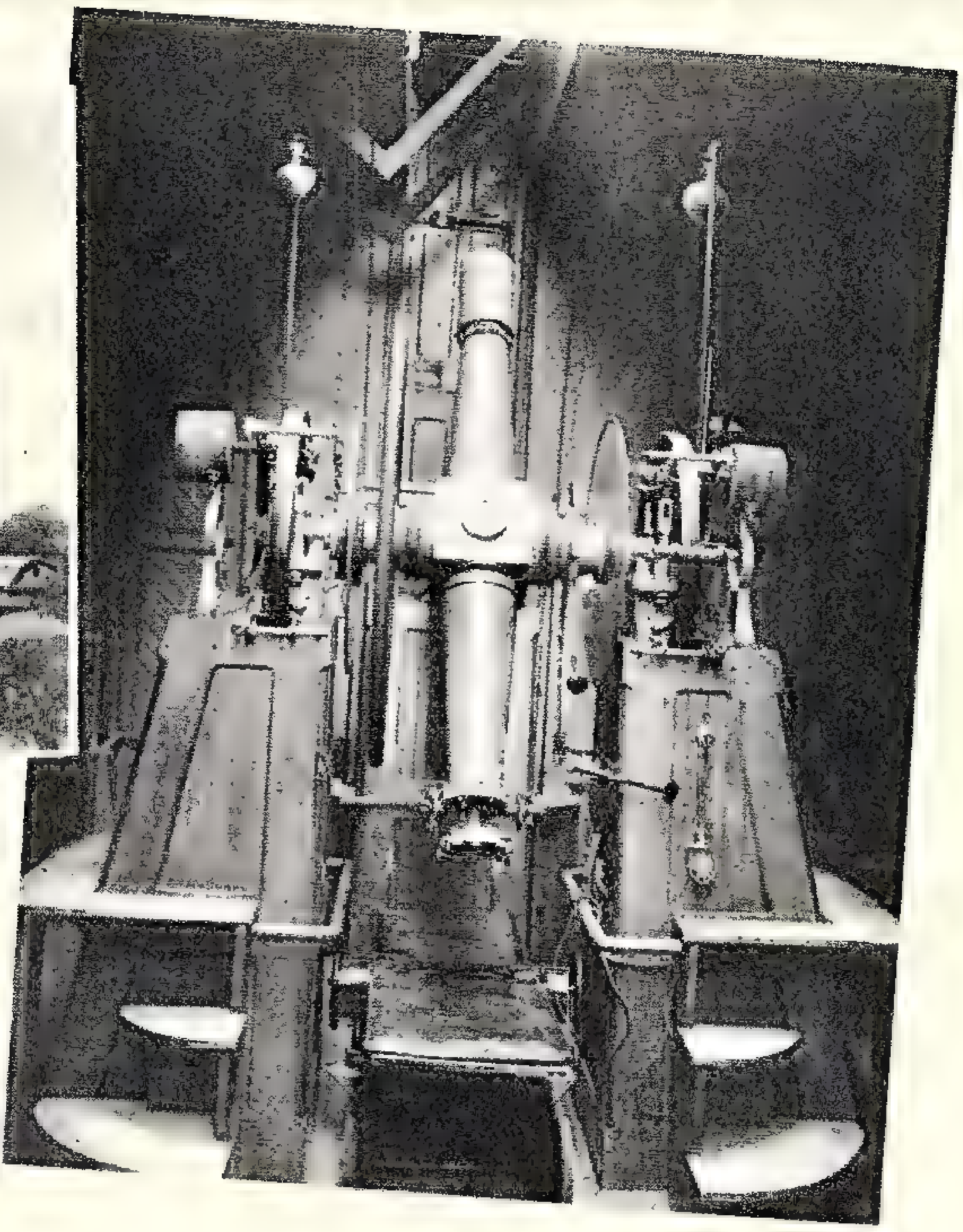
The new Ford, with its front like the rakish prow of a boat, and "tear drop" headlights set into streamlined fender aprons, makes it bow. The hood is hinged at the back, lifts from the front.



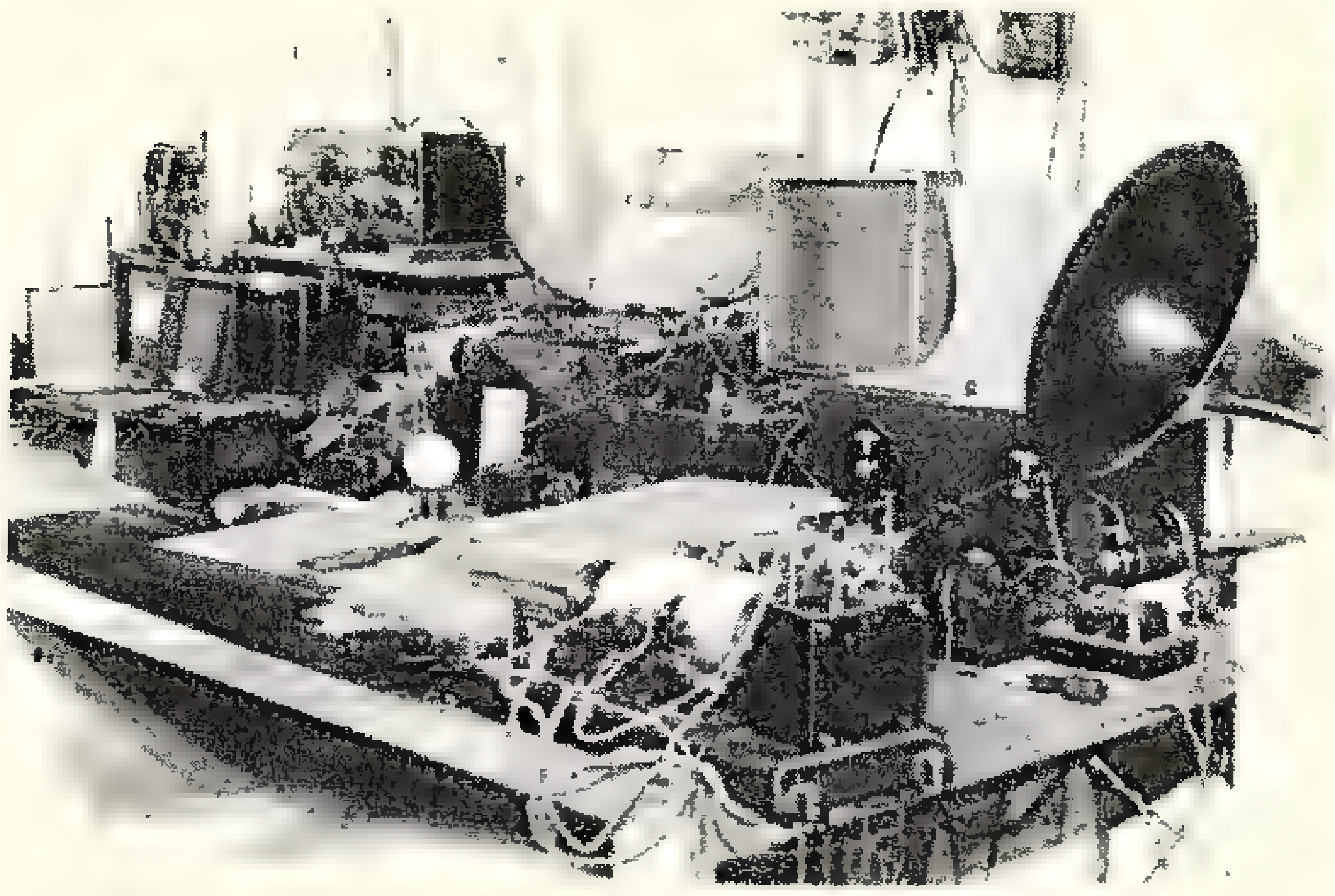
Britain is still going in for midget autos, and latest is the "Scoota-car Special," which has a top speed of 45 m. p. h. and can get 80 miles on a gallon.

ARE WE DRIFTING TO CHINA?

Ottawa Observatory, where continent's drift is studied.



Meridian circle transit instrument used in measuring possible shift of North America toward Asia. At left is shown a wireless receiving station at special observatory.



IF YOU live long enough you may yet reach China without taking train, steamer, plane or rocket. For both North and South America are suspected of drifting over that way and scientists are figuring how long it will take, and observers from many parts of the world have sent in their reports to Paris for comparison.

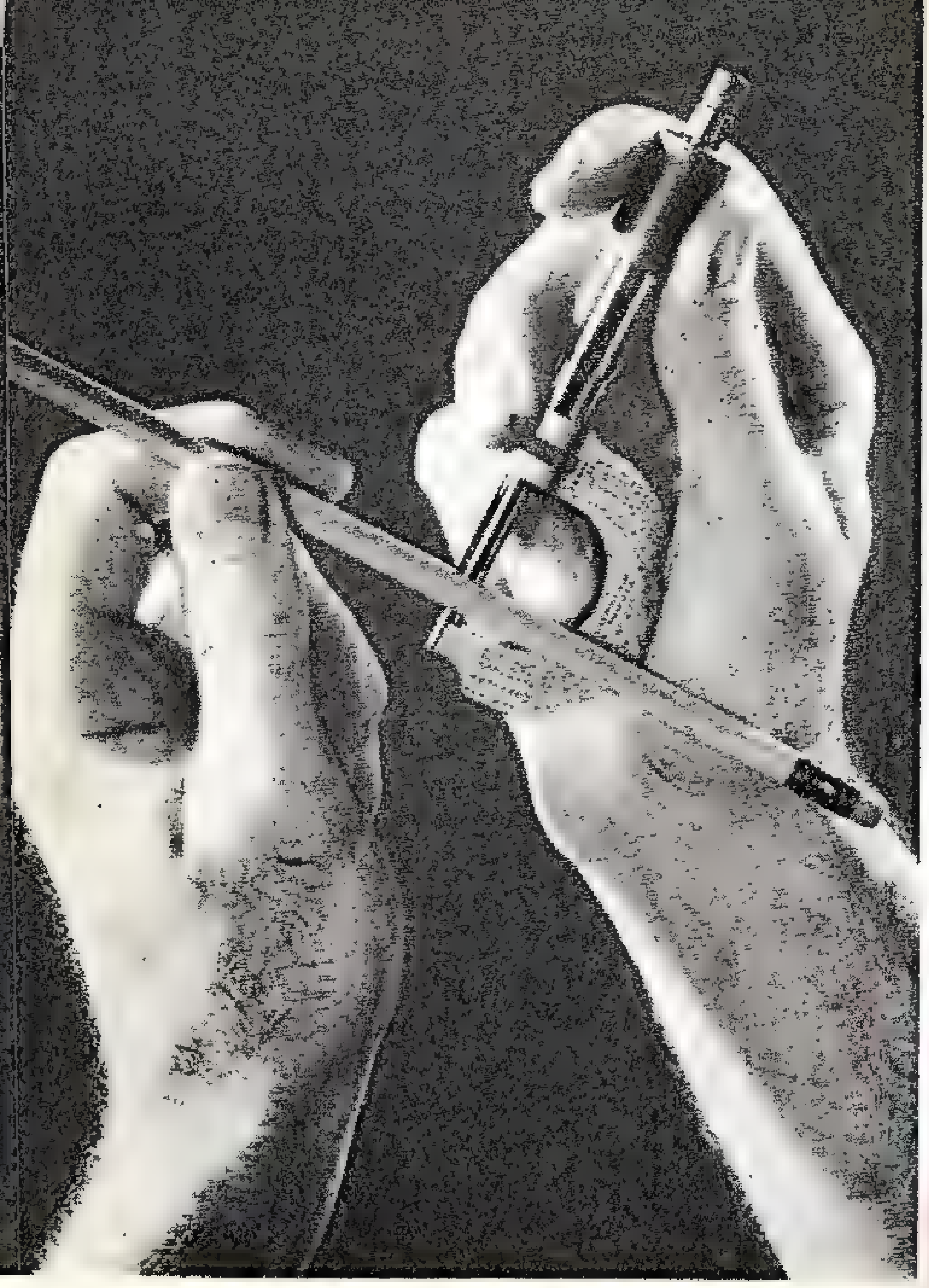
Preliminary figures over a seven year interval do not show us traveling westward, but, say scientists, the drift is so small the human error factor in the many observations may be just enough to counteract the drift. And so they still cling to the hope that the Americas are on a westward journey to join Asia.

In 1926 and again in 1933 stations were set up at Greenwich (England), Ottawa, Vancouver and Tokio in a northern chain, and at Algiers, Washington, San Diego and Shanghai in a middle zone. In addition, many other observatories throughout the world took part. In 1926 there were over 40 observatories at work on the theory and in 1933 about 100 took measurements.

All these observations are being taken to prove or disprove the Wegener theory that North and South America once were joined to Europe and Africa. Because of the interlocking jig-saw shape of the four continents, geologist Wegener advanced the theory that the four continents and Australia were once one land mass.

The observations, taken with a large assortment of instruments, wireless signals, and the help of the stars, covered between two and three months in 1926 and 1933. Each observatory completed a preliminary computation and then handed the whole thing over to the International Time Bureau at Paris, where the final results are being compiled.

According to the theory, the continental drift amounts to two or three feet per year. The amount is largely guess work, however. But on the assumption that the amount is right, it would take 50 years before the Americas moved 100 to 150 feet towards China. Which is not a large amount on a continent measuring 3,000 miles.



Within the thickness of the pencil in the calipers, 20,000 thin razor edges can be stacked. Each edge is one-eighty-thousandth of an inch.

BEHIND THE

by Robert W. Gordon

The oscillograph, an instrument that "sees" through steel, is used to detect hidden flaws.

TAKE a look at any group photograph of half a century ago. No matter what their station in life, the faces of the men you see there will be adorned with luxuriant crops of whiskers. Some were clipped plain, with the simple dignity of a cemetery hedge. Others were brushed and trimmed in weird and wonderful designs, like decorations on a wedding cake.

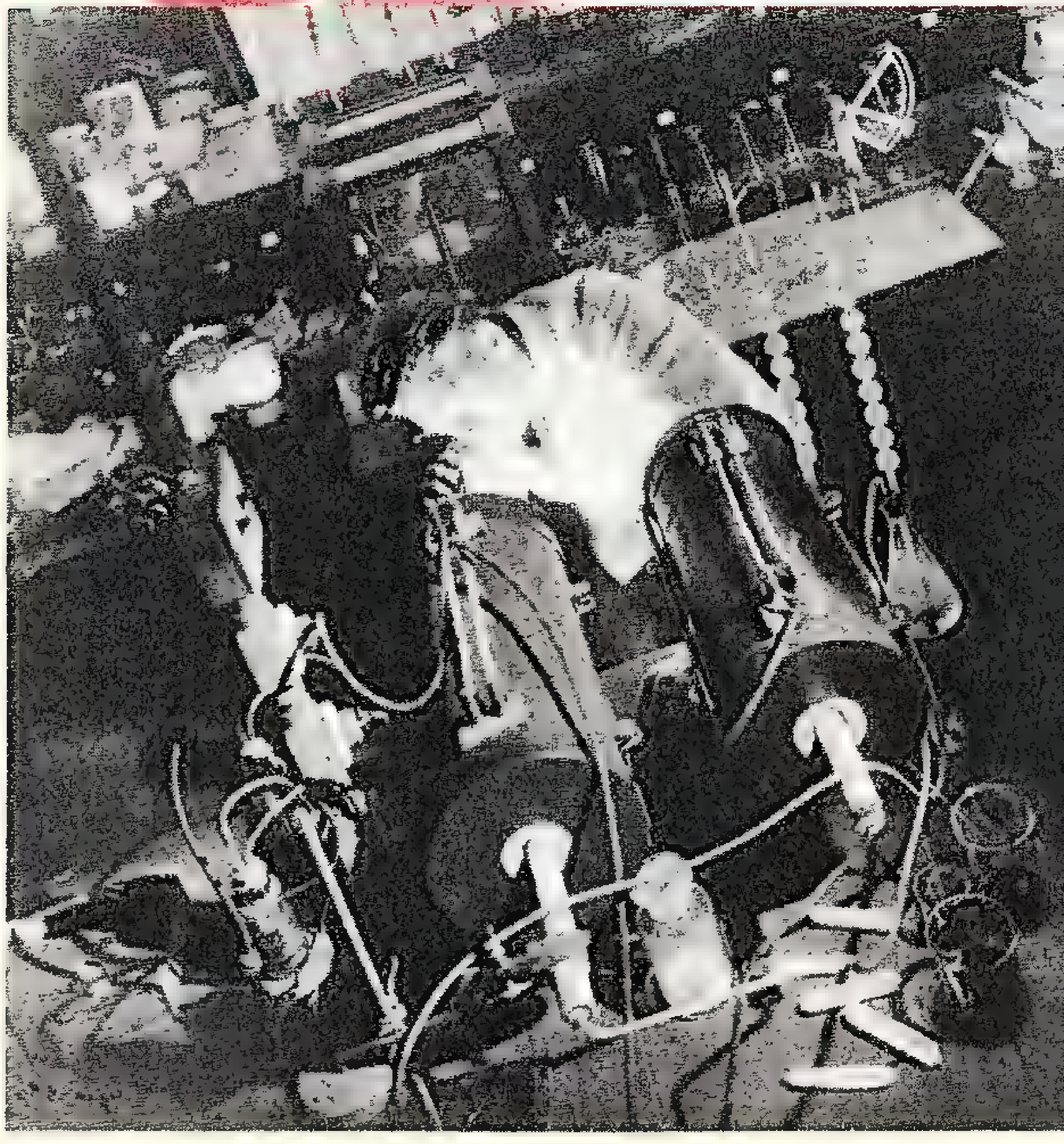
Now take a look along the street—any street in almost any country. You see a new race of men entirely. You can really see their faces, and they are bright and clean. No more of this hiding behind the bush. Their jaws are as bare of foliage as an oak tree in January.

Has science given us a new race of whiskerless males?

You know it has not. The whisker crop is as bountiful as ever, but it is harvested earlier—harvested every morning by the majority of men throughout the world.

Now the only conclusion we can draw from this is that men never really liked whiskers any more than did the women. But down through the centuries, elimination of the beard remained an ordeal.

Then along came King C. Gillette in 1895 with the safety razor. Whiskers didn't disappear over night. Men were proud of the



A sample goes into an electric furnace to be burned in a stream of oxygen. Vapors are analyzed to see that the proper proportion of carbon is present.

RAZOR BLADE

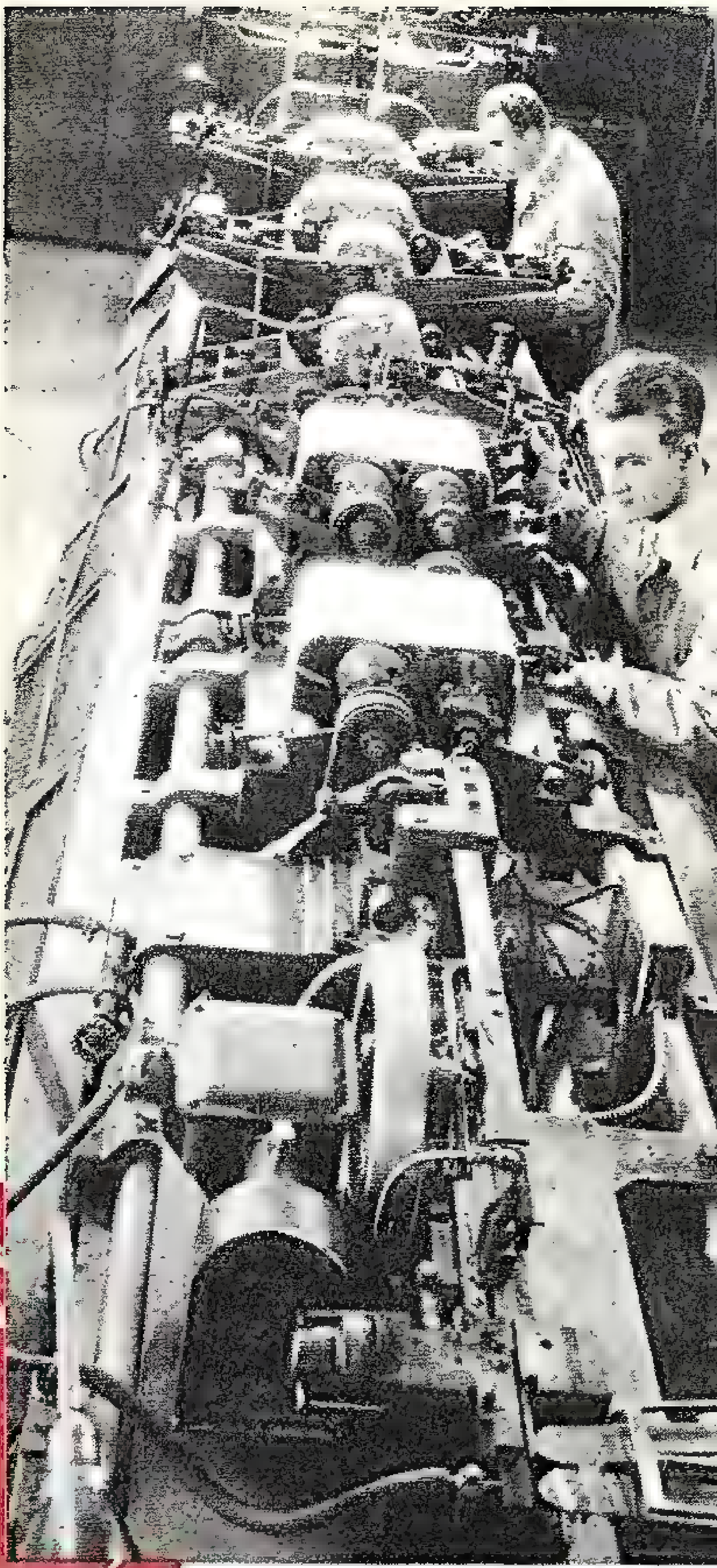
wiry toughness of their beards. You couldn't convince *them* that a little piece of metal stuck into a miniature double-edged hoe, could make shaving a painless, two-minute chore.

Even those few with faces too handsome to conceal, who went through the daily face-scraping with much the same martyr-to-looks spirit a woman assumes when getting a permanent, demanded a great steel forging, laboriously hollow ground, and equipped with a fancy handle. It required a lot of stropping and honing to keep a keen edge on that forging they called a razor.

Gillette had the revolutionary idea that it was only the edge you shaved with, and that the rest didn't really matter. He popularized shaving by developing an edge so sharp it is invisible, yet so cheap you can throw it away after using it once.

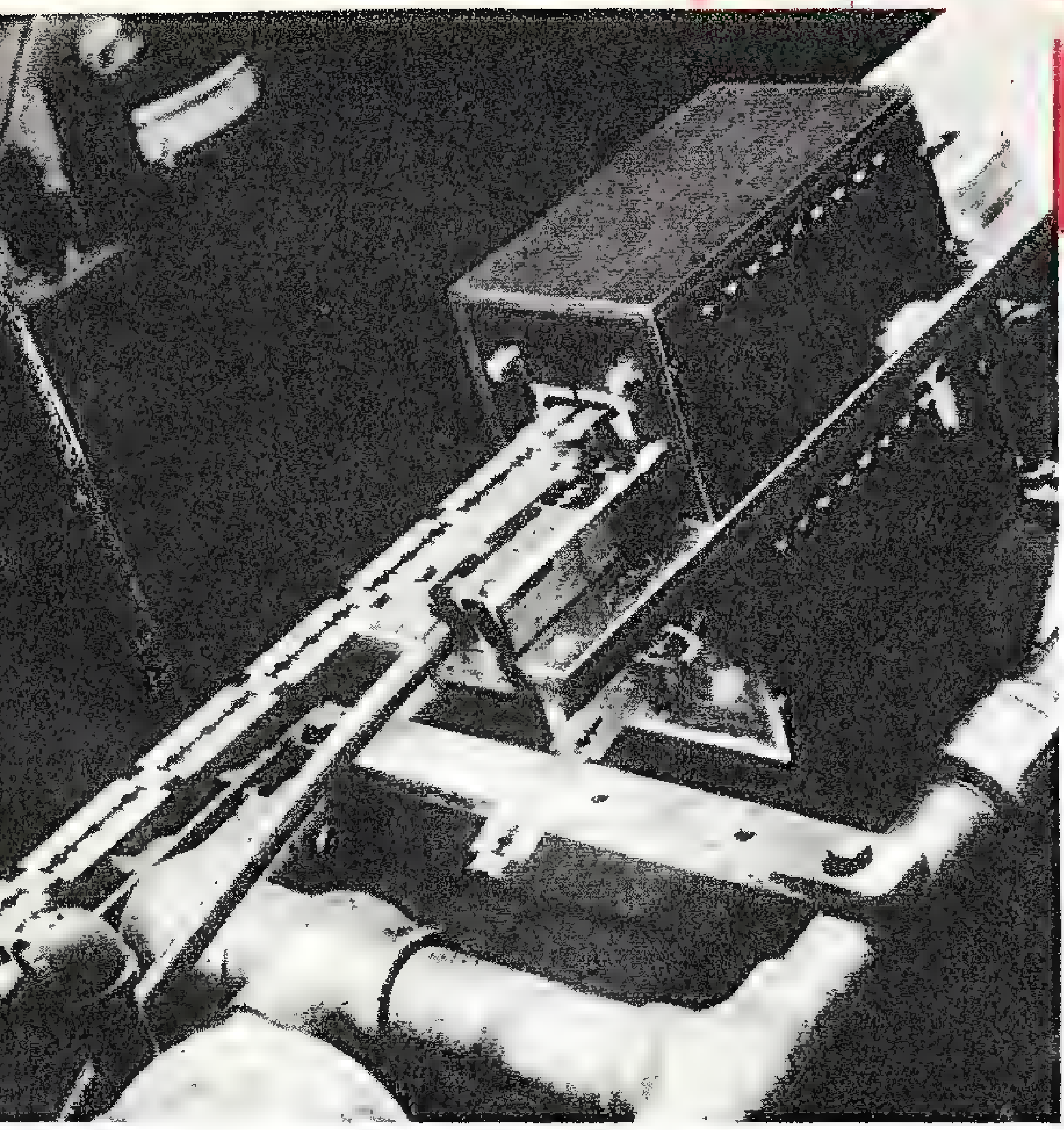
And the edge of the razor blade actually is invisible, even when looked at through the highest-powered microscope. The cutting edges of 80,000 blades, laid side by side, would occupy only one inch of space.

They demonstrate this absolute invisibility at the factory in Boston. They will show you a stack of blades a foot high, clamped together on a special holder. So accurately are the blades cut that the unsharpened ends appear as one solid bar of shining steel. Now turn the stack on edge. You see no shining metal there—only solid black. There is not enough metal on the cutting edges of that stack of blades to reflect a single beam of light. You can photograph it and get nothing on the plate but a solid black rectangle. Place a single blade on its side under a high-power microscope, and there will be no saw-tooth effect—only a straight line. Place the blade

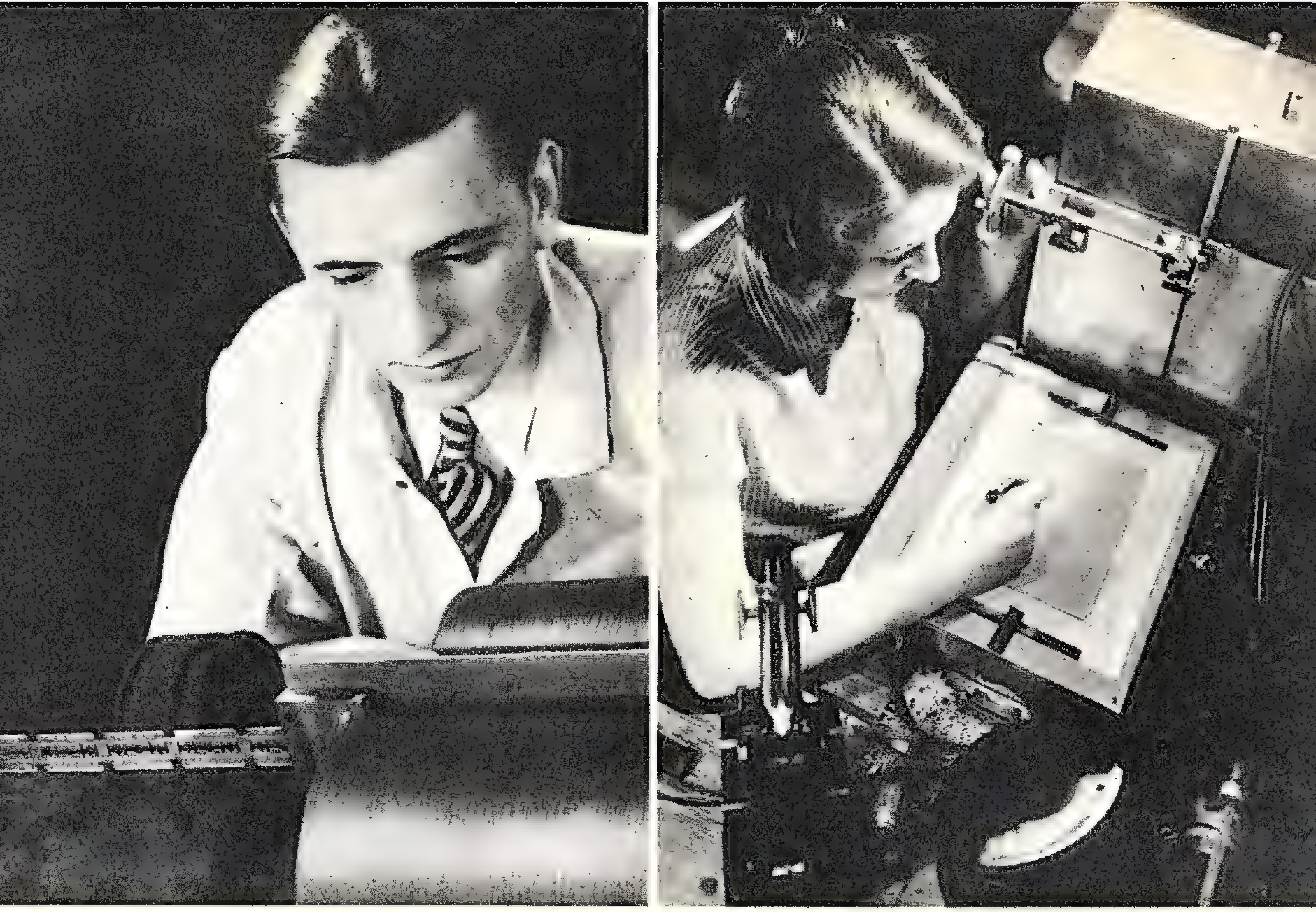


This machine performs one grinding, three honing and one stropping operation and cuts and stacks the blades on racks.

Samples of each coil are submitted to the diamond test for hardness. If it fails in the requirements, coil is rejected.



Variations in hardness are detected by this black box in the Gillette factory at Boston. If the steel in process above does not match the master strip below in hardness, the electricity going to furnace is varied.



Blades are pictured at left during the sharpening process. Two sets of grinding wheels, one for each edge, first remove the rough stock. The girl at the right is operating the photoelectric sharpness testing machine.

on edge and you will see nothing. One-eighty-thousandth of an inch is too infinitesimal a point in space to be seen by the eye, even when aided by the highest-powered microscope science has produced.

To obtain a cutting edge so sharp, close control and microscopically-fine limits of accuracy are required for every operation of manufacture.

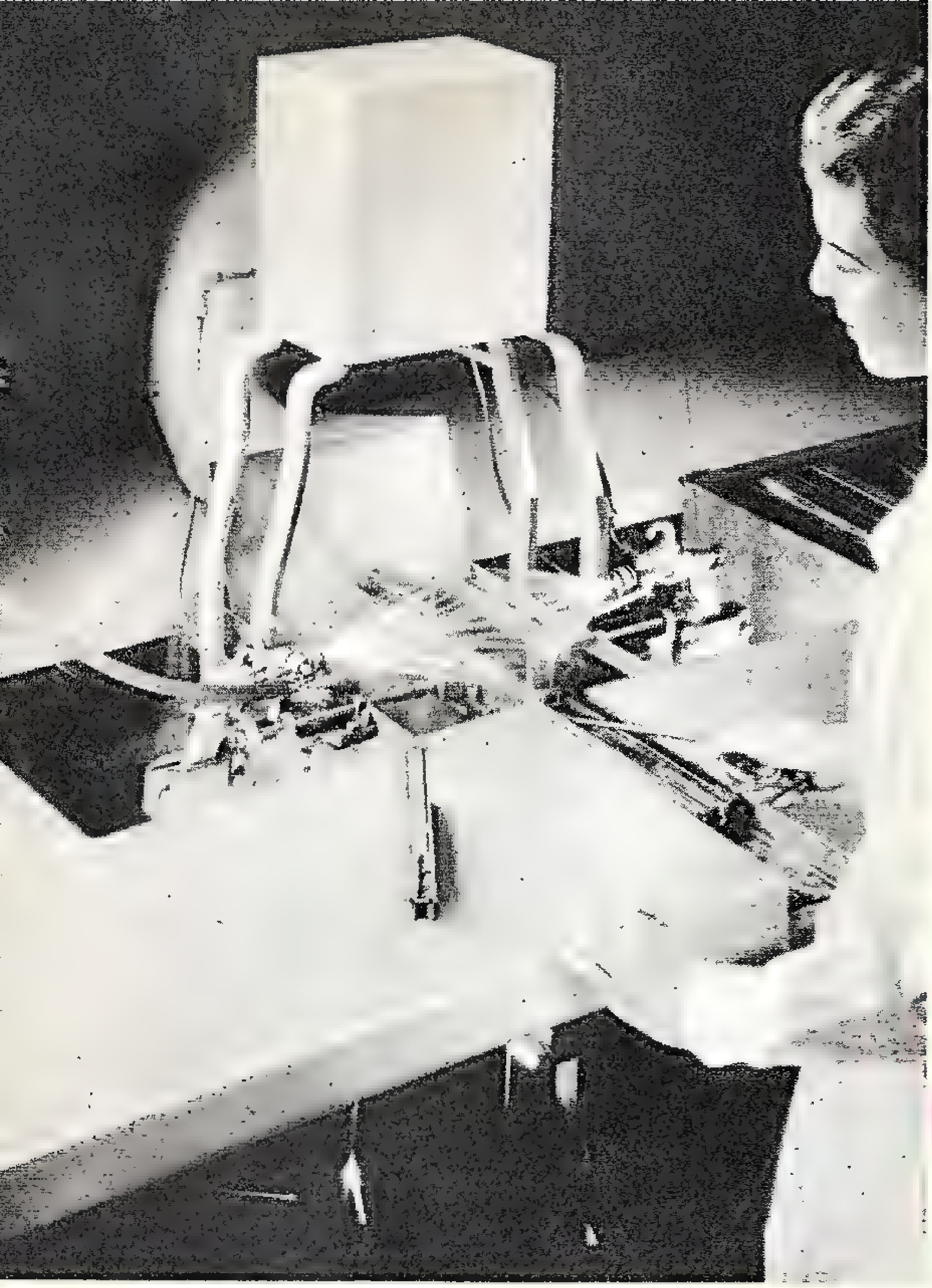
Swedish steel is used because of the high quality of Swedish raw materials and the long experience and great skill in rolling possessed by the Scandinavian mills. To insure uninterrupted production schedules with accompanying uniformity of quality, a tremendous steel inventory, representing an investment of several hundred thousand dollars, is carried in storage.

The coils of raw steel arrive from Sweden, each wrapped in heavy crepe paper, covered with oily waterproof paper, while the surfaces of the steel ribbons are coated with a special rust-proofing compound. Six coils are hermetically sealed in a tin container, which is protected by a wooden box. Thus protected, the shipping case could be immersed in sea water without damage to the contents.

As the cases are opened at the factory, a sample is cut from each end and tagged with the number of the coil. Another tag is placed on the coil itself, and follows the steel throughout the factory until the finished blades are packed. Each person who handles that particular coil, whether for manufacture or testing, must initial the tag. When the coil passes from one stage of manufacture to another, it is checked in and out of the control room. This intricate system of checking and rechecking makes it possible to detect flaws instantly and trace them to their source. It makes it possible to guarantee that only perfect blades will be offered for sale.

The original samples of the soft cold-rolled steel are submitted to a series of rigid laboratory tests to see that specifications for width, thickness, and metallurgical characteristics are fulfilled, and only when these tests are completed, and an O. K. placed on the tag, is the coil released for production.

Width and thickness are checked by micrometer gauges, and the variations permitted are infinitesimally small. A sample is then placed in the oscillograph, an instrument that virtually sees through steel. Hidden flaws, strains resulting from improper rolling, incorrect micro-structure, are instantly detected.



As a final step in the long process, finished blades are sprayed with a powerful antiseptic solution. They are then wrapped and sealed.

Samples of each coil are then sent to the laboratory and microphotographed at 3,000 diameters. A trained metallurgist studies these photographs to determine if the inner structure, the combination of elements making up the metal, is suitable for blades.

Another sample goes into an electric furnace, to be burned in a stream of oxygen. Vapors resulting from this combustion are analyzed chemically to see that exactly the right proportion of carbon is present.

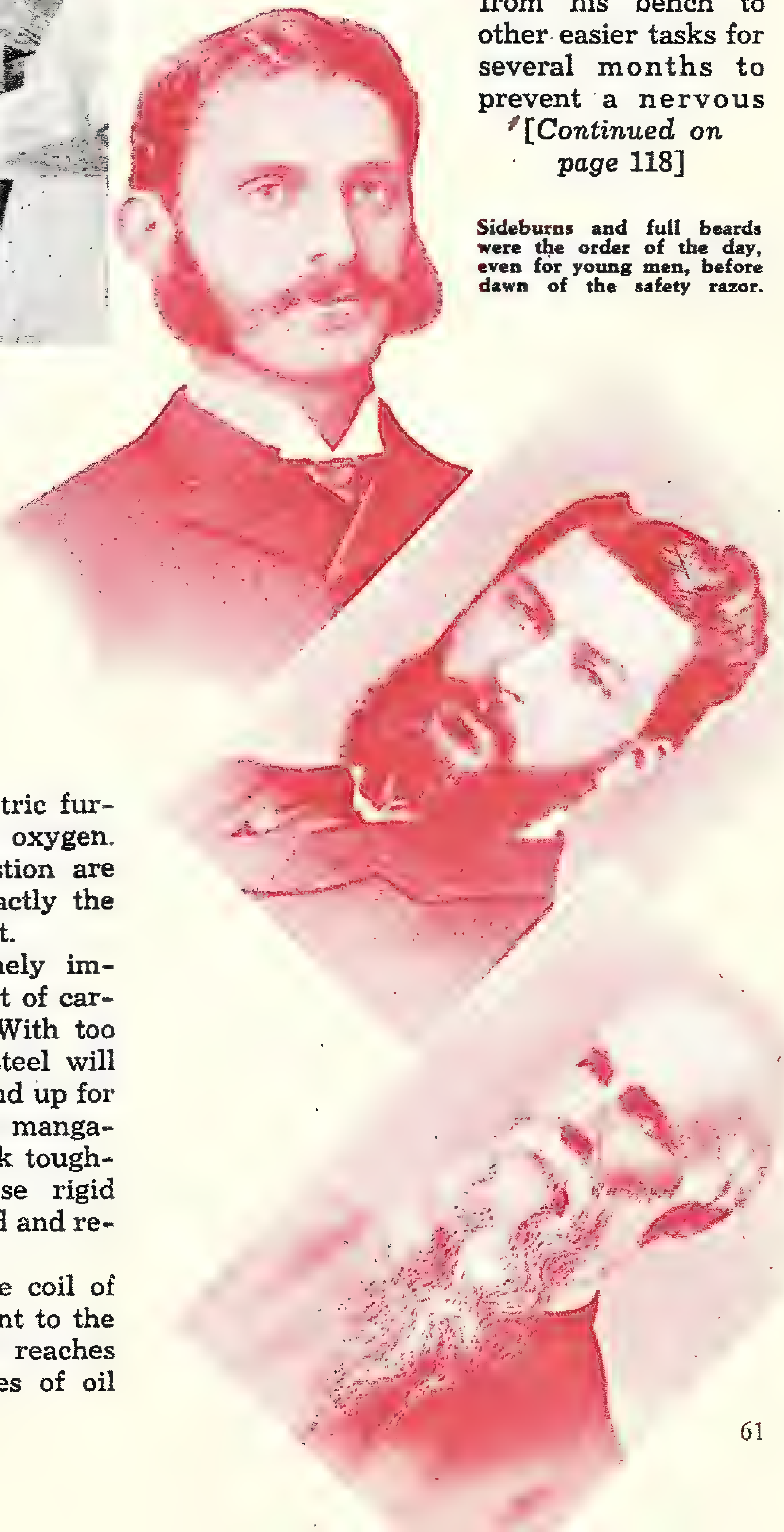
This chemical content is extremely important. Without the proper amount of carbon the steel will lack hardness. With too much sulphur or phosphorus, the steel will not yield a cutting edge that will stand up for a number of shaves. With too little manganese or chromium, the steel will lack toughness. Metal failing to meet these rigid laboratory tests is immediately crated and returned to Sweden.

If approved in the laboratory, the coil of soft steel is wound on a reel and sent to the perforating machine. But before it reaches the dies it feeds through two series of oil wipers, which remove any foreign matter adhering to the strip and add an oil which aids the perforating die and prevents rust between this and the next operation.

These dies that punch out the center slot are the acme of accuracy. They must be if the blade is to be held in the razor at the correct position for a proper shave. Unable to obtain such accuracy elsewhere, the factory employs its own corps of die cutters, any one of whom could grind the print off this page without removing a particle of the paper.

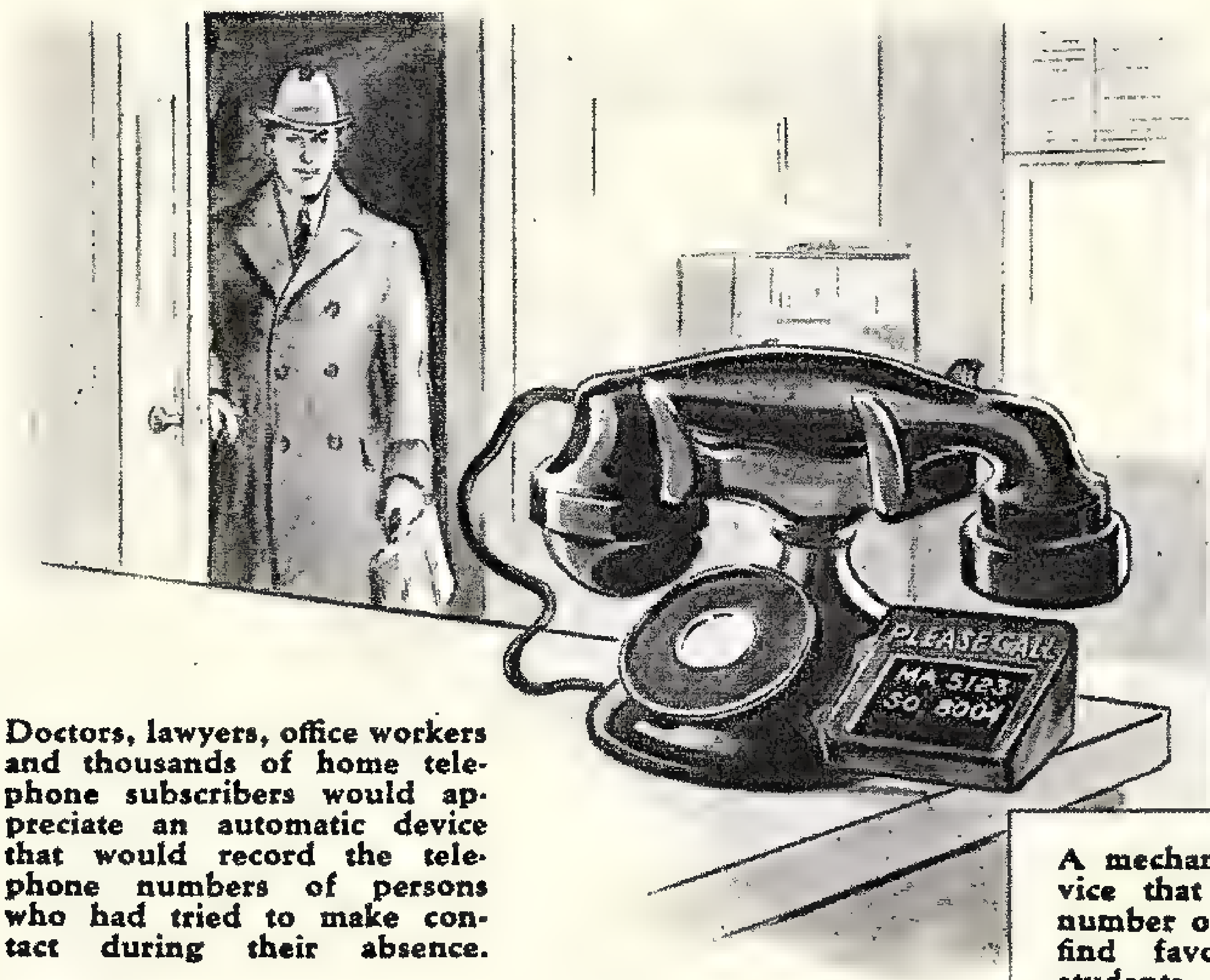
So critical is the workmanship demanded here that in certain cases it has been necessary to release a man from his bench to other easier tasks for several months to prevent a nervous

[*Continued on page* 118]

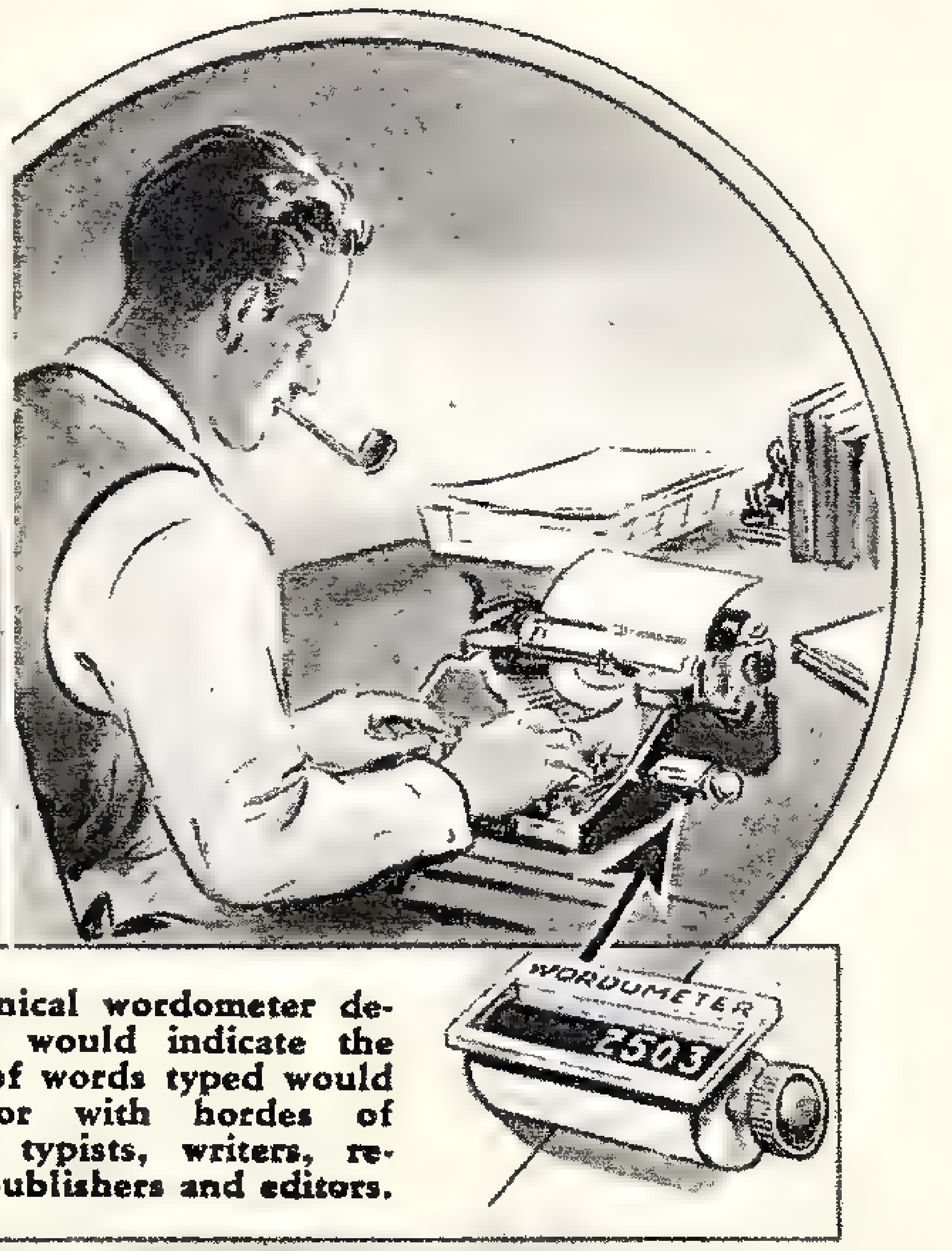


Sideburns and full beards were the order of the day, even for young men, before dawn of the safety razor.

Women Head Winner's List in M. M. Inventions Contest



Doctors, lawyers, office workers and thousands of home telephone subscribers would appreciate an automatic device that would record the telephone numbers of persons who had tried to make contact during their absence.



A mechanical wordometer device that would indicate the number of words typed would find favor with hordes of students, typists, writers, reporters, publishers and editors.

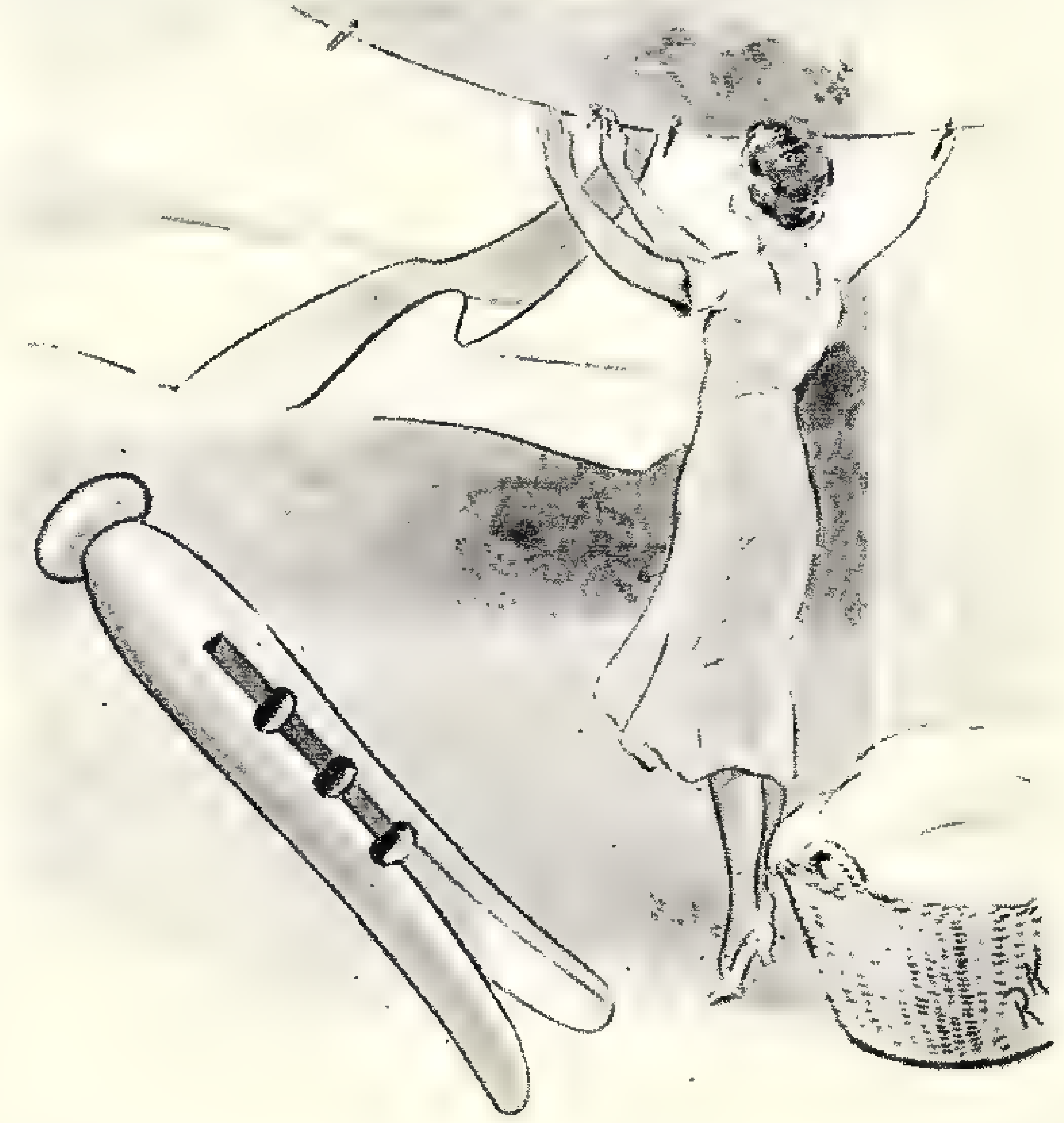
WOMEN head the list of winners of the MM Needed Inventions Contest this month. Miss Nan Conklin, of 8527 Thirtieth Street, N. W., Seattle, Wash., was awarded first prize of $25 cash for suggesting an automatic telephone device that would record the telephone numbers of incoming calls in the event the calls go unanswered due to no one being at hand to receive them.

PRIZES

First Prize	$25.00 in Cash
Second Prize	10.00 in Cash
Third Prize	5.00 in Cash
Three Fourth Prizes	2.00 each
Four Fifth Prizes	1.00 each
Total—10 Prizes	50.00 in Cash

Increased satisfaction on the part of telephone subscribers would result from the development of such a device. Upon arriving at home or office, one would immediately know if someone had been trying to make telephone contact, and a glance at the indicator board would show the number to be called.

Mrs. Ada Gearhard, of 1509 Division Street, Boise, Idaho, won second prize of $10 with a suggestion for a wordometer. The wordometer, a mechanical typewriter attachment, would indicate the number of words typed. Thousands of typists, writers and reporters would welcome the wordometer since it would eliminate the task of counting each word after typing out a page of copy.



Ordinary straight clothespins sometimes lose their grip when wind tugs at the heavily laden clothes line. A notched clothespin should overcome this annoyance to housewives.

A suggestion for a simple clothespin, designed to prevent working loose while being

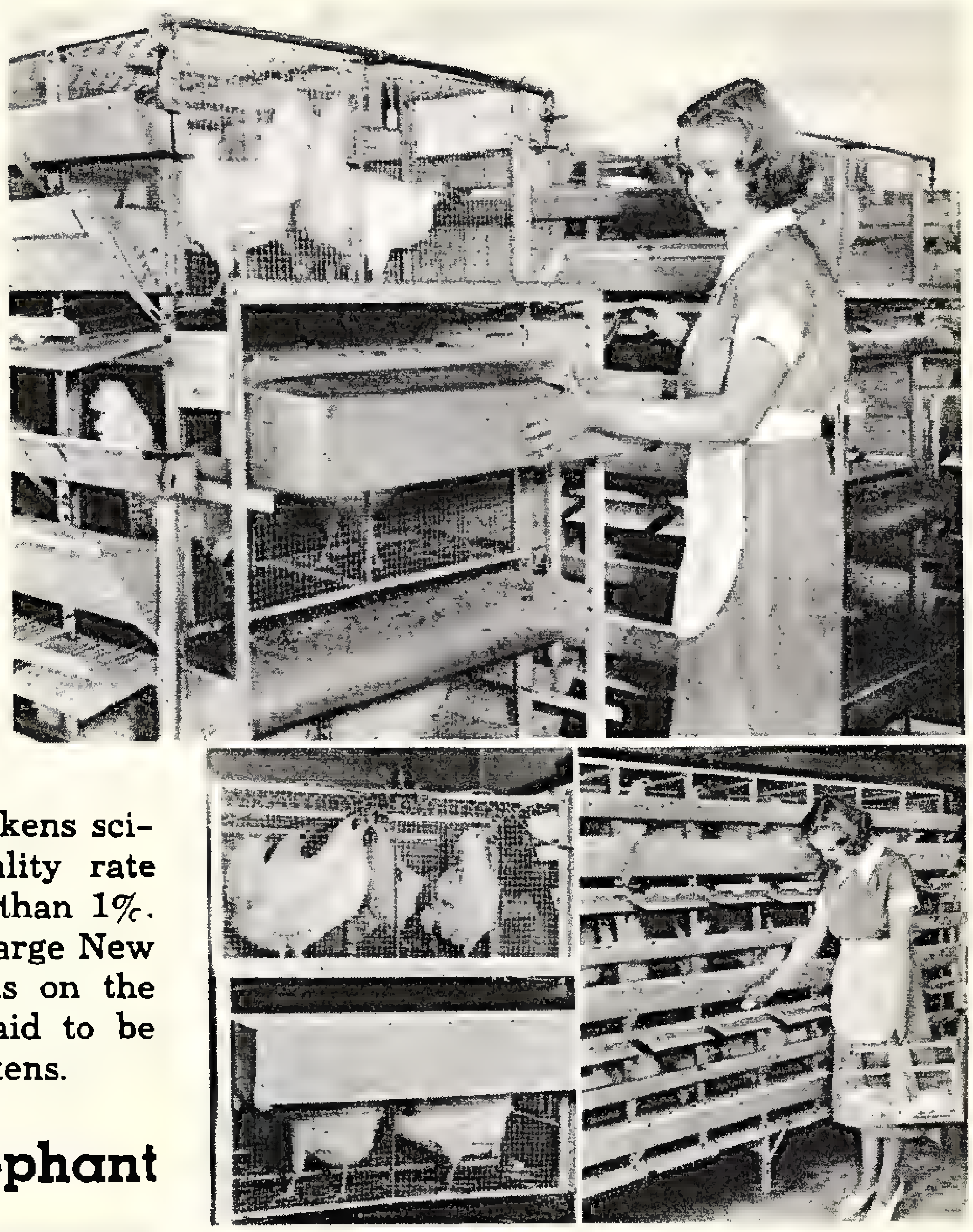
[*Continued on page* 125]

Lone Girl Raises 15,000 Chickens In Indoor Cages

ADOPTING a system invented by Milton H. Arndt, of Trenton, N. J., a 19 year-old Long Island girl, Lillian Swenson, is raising and taking care of 15,000 chickens indoors. The chickens never see or need the sunlight for the necessary vitamin "D" is supplied in their food.

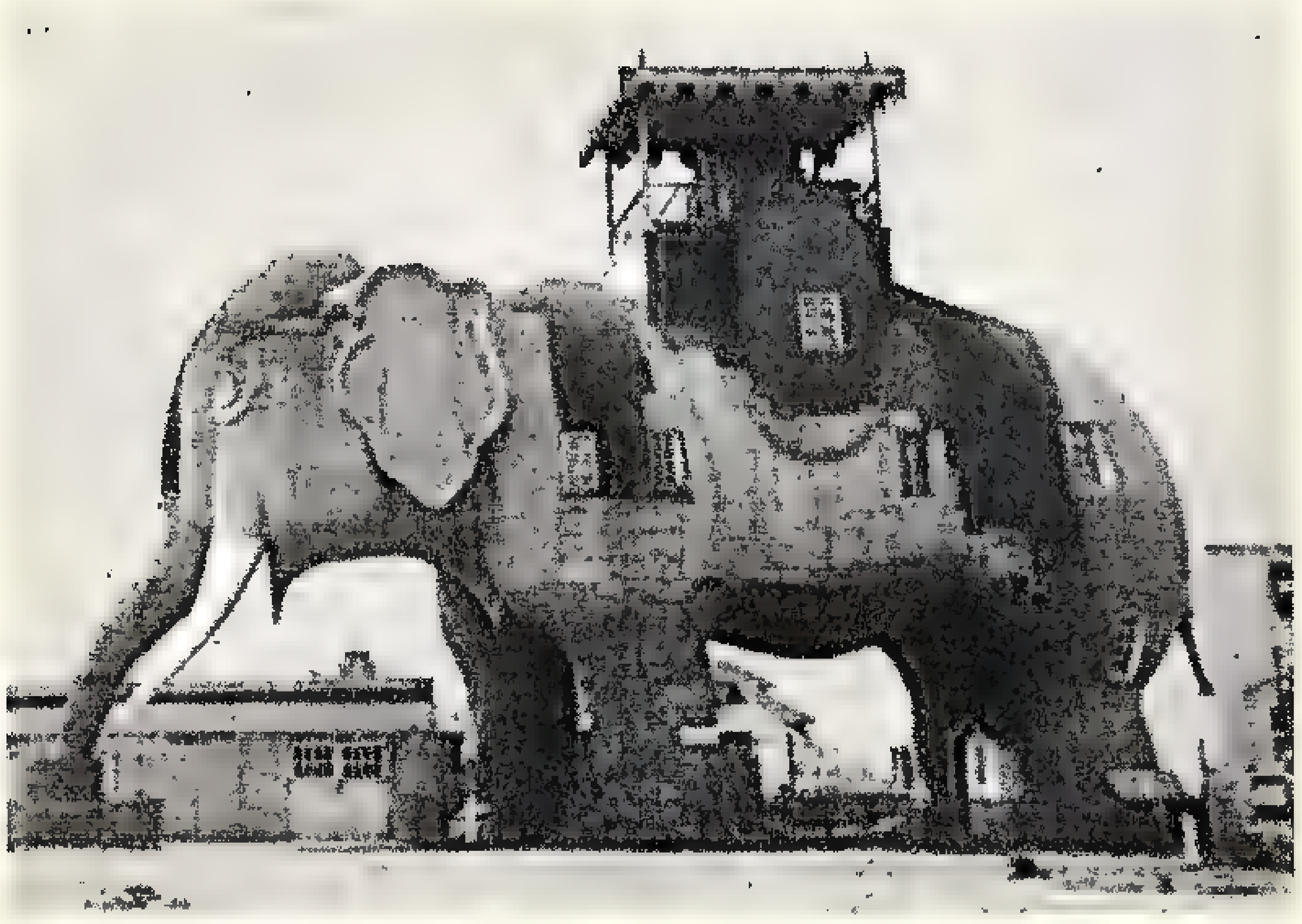
Each chicken has its own wire compartment measuring about one and a half feet square. Compartments are arranged in batteries of 100 chickens each making it possible to house them in a small area. Running water and individual feed troughs are located in each compartment.

Through the use of the indoor compartment system, using cellars, lofts, etc., and feeding the chickens scientifically balanced rations, mortality rate has been cut from 40-60% to less than 1%. So successful is this method that a large New York hotel raises its own chickens on the roof. The flavor of the eggs is said to be superior to those of barnyard chickens.



Top—Lillian Swenson shows how she cleans the cages in a few minutes by turning a crank that moves floor conveyor belt. Bottom right—Collecting eggs that have rolled against rubber guard. Charts are kept of each chicken. Left—Cage close-up.

House Shaped Like Elephant

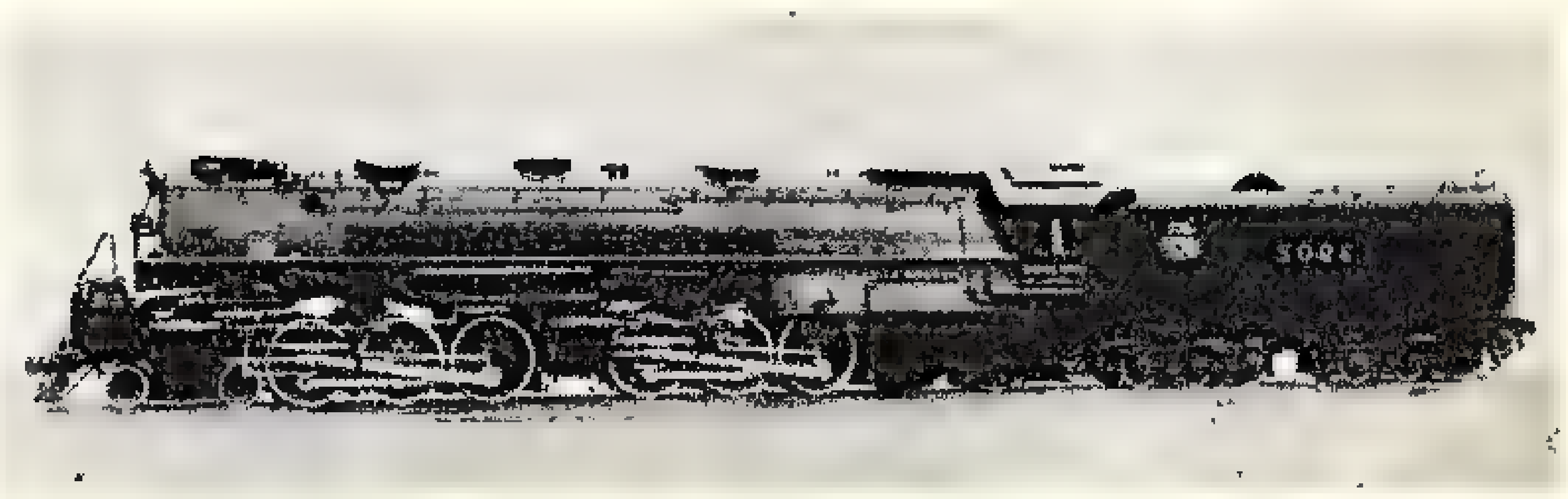


This elephant-shaped house at Margate City, N. J., has 22 windows. It consists of over a million pieces of wood, 8560 ribs, 200 kegs of nails, 12,000 square feet of tin, four tons of bolts.

A HOUSE built in the shape of an elephant is located at Margate City, N. J. Erected in 1882 by James V. Lafferty, the novel home is said to be the only one of its kind. The body is 38 feet long, the circumference, 80 feet. The head is 26 feet long and 48 feet around. Legs are 22 feet long with a diameter of 10 feet. Glass eyes have an 18-inch diameter.

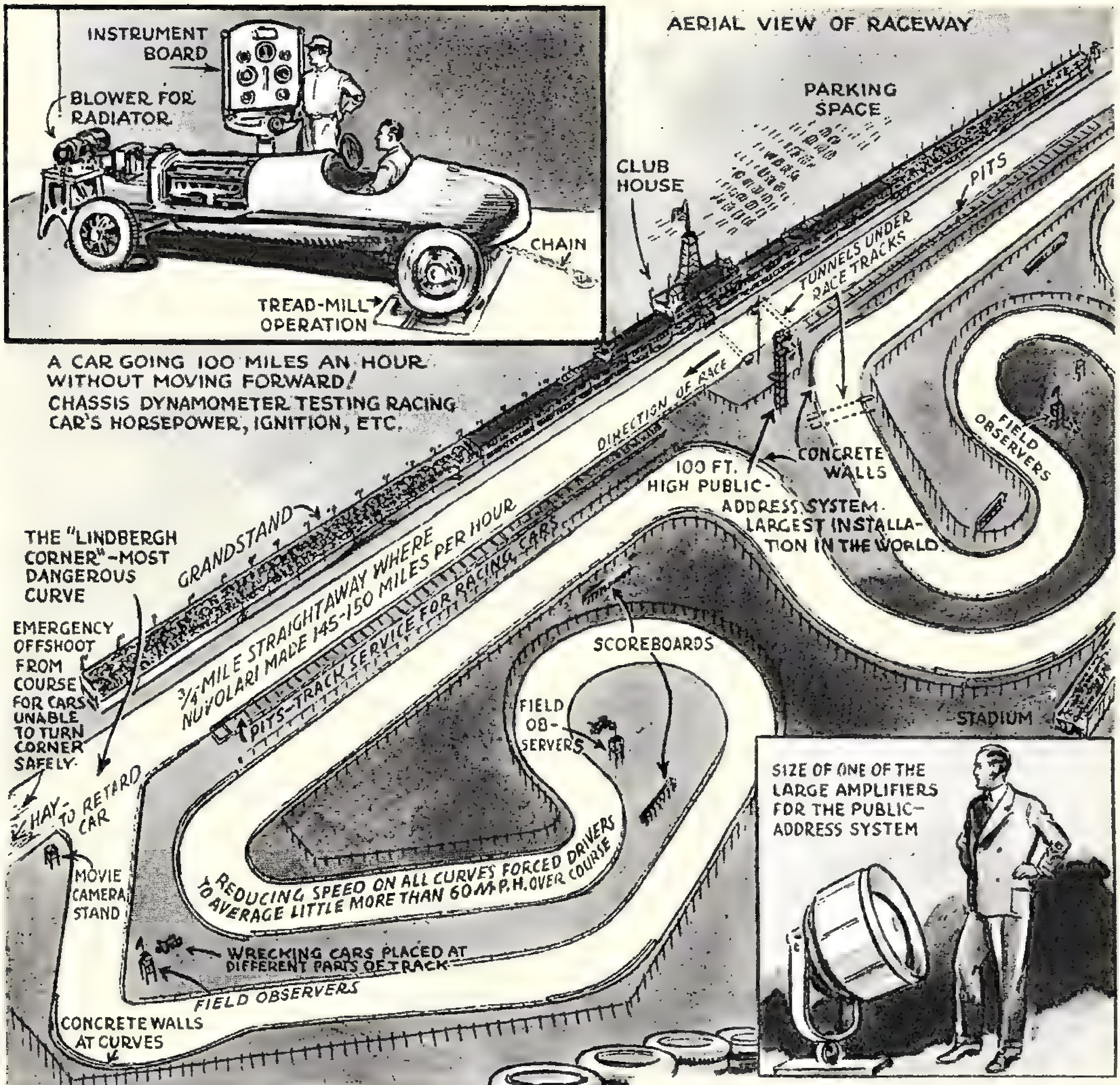
Locomotive Pulls 100 Cars

WITH an over-all length of 110 feet, a new Challenger type locomotive of the Union Pacific Railroad is powerful enough to pull a freight train of 100 loaded cars at a speed of a mile per minute. The locomotive weighs 432½ tons empty. The firebox of the engine is so large, 9x12 feet, that a mechanical coal stoker is needed. Tender carries 22 tons of coal, 19,000 gallons of water.



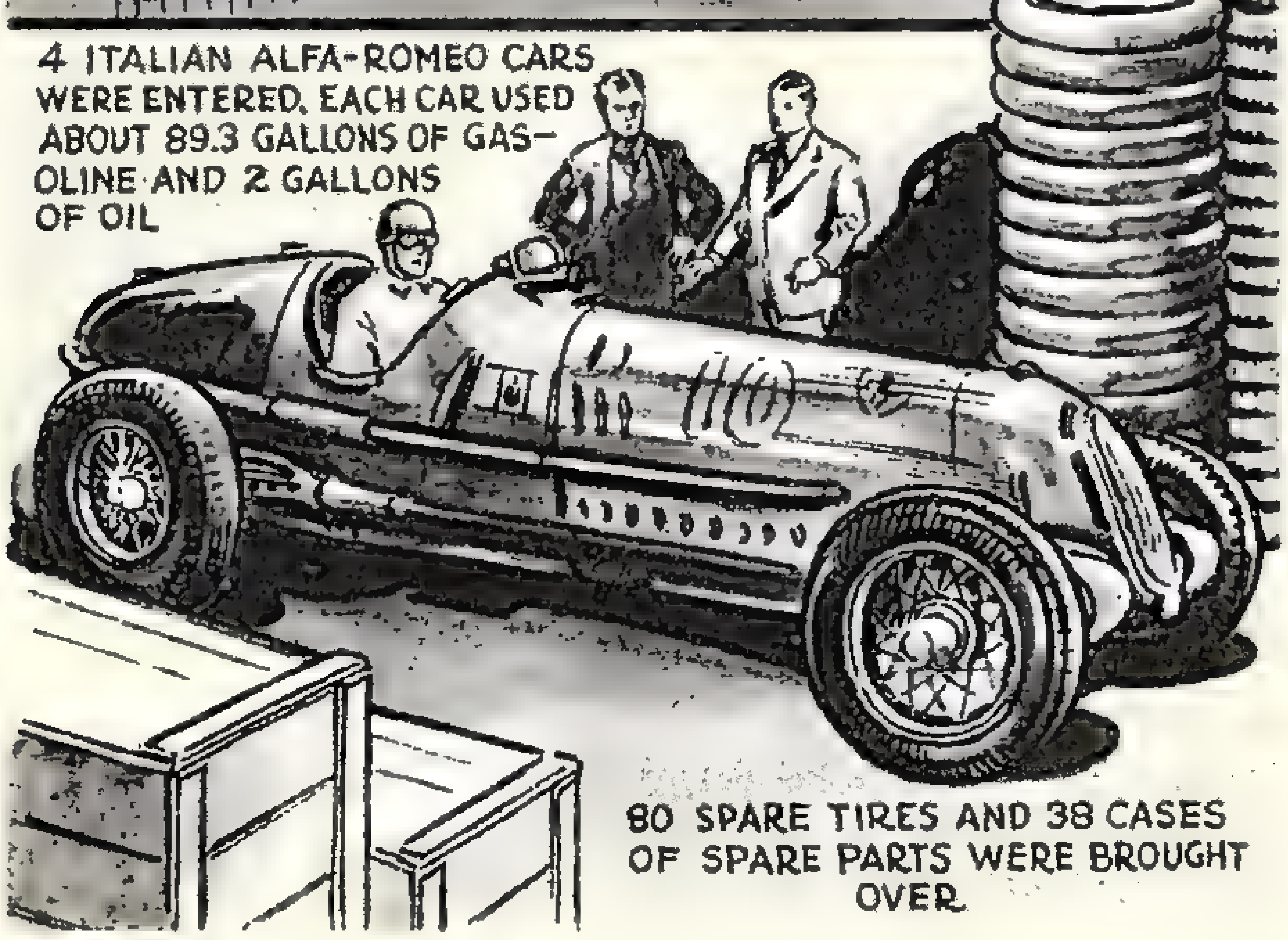
The American Locomotive Co., of Schenectady, N. Y., built this 110-foot engine for the Union Pacific Railroad. It will haul 100 cars. Drive wheels are 5 ft., 9 inches in diameter.

AMERICA'S NEWEST


INSTRUMENT BOARD
BLOWER FOR RADIATOR
CHAIN
TREAD-MILL OPERATION
AERIAL VIEW OF RACEWAY
PARKING SPACE
CLUB HOUSE
PITS
TUNNELS UNDER RACE TRACKS
DIRECTION OF RACE
CONCRETE WALLS
100 FT. HIGH PUBLIC-ADDRESS SYSTEM. LARGEST INSTALLATION IN THE WORLD.
FIELD OBSERVERS
GRANDSTAND
THE "LINDBERGH CORNER"-MOST DANGEROUS CURVE
EMERGENCY OFFSHOOT FROM COURSE FOR CARS UNABLE TO TURN CORNER SAFELY.
3/4-MILE STRAIGHTAWAY WHERE NUVOLARI MADE 145-150 MILES PER HOUR
PITS-TRACK SERVICE FOR RACING CARS
SCOREBOARDS
FIELD OBSERVERS
STADIUM
HAY TO RETARD CAR
MOVIE CAMERA STAND
REDUCING SPEED ON ALL CURVES FORCED DRIVERS TO AVERAGE LITTLE MORE THAN 60 M.P.H. OVER COURSE
WRECKING CARS PLACED AT DIFFERENT PARTS OF TRACK
FIELD OBSERVERS
CONCRETE WALLS AT CURVES

A CAR GOING 100 MILES AN HOUR WITHOUT MOVING FORWARD! CHASSIS DYNAMOMETER TESTING RACING CAR'S HORSEPOWER, IGNITION, ETC.

SIZE OF ONE OF THE LARGE AMPLIFIERS FOR THE PUBLIC-ADDRESS SYSTEM



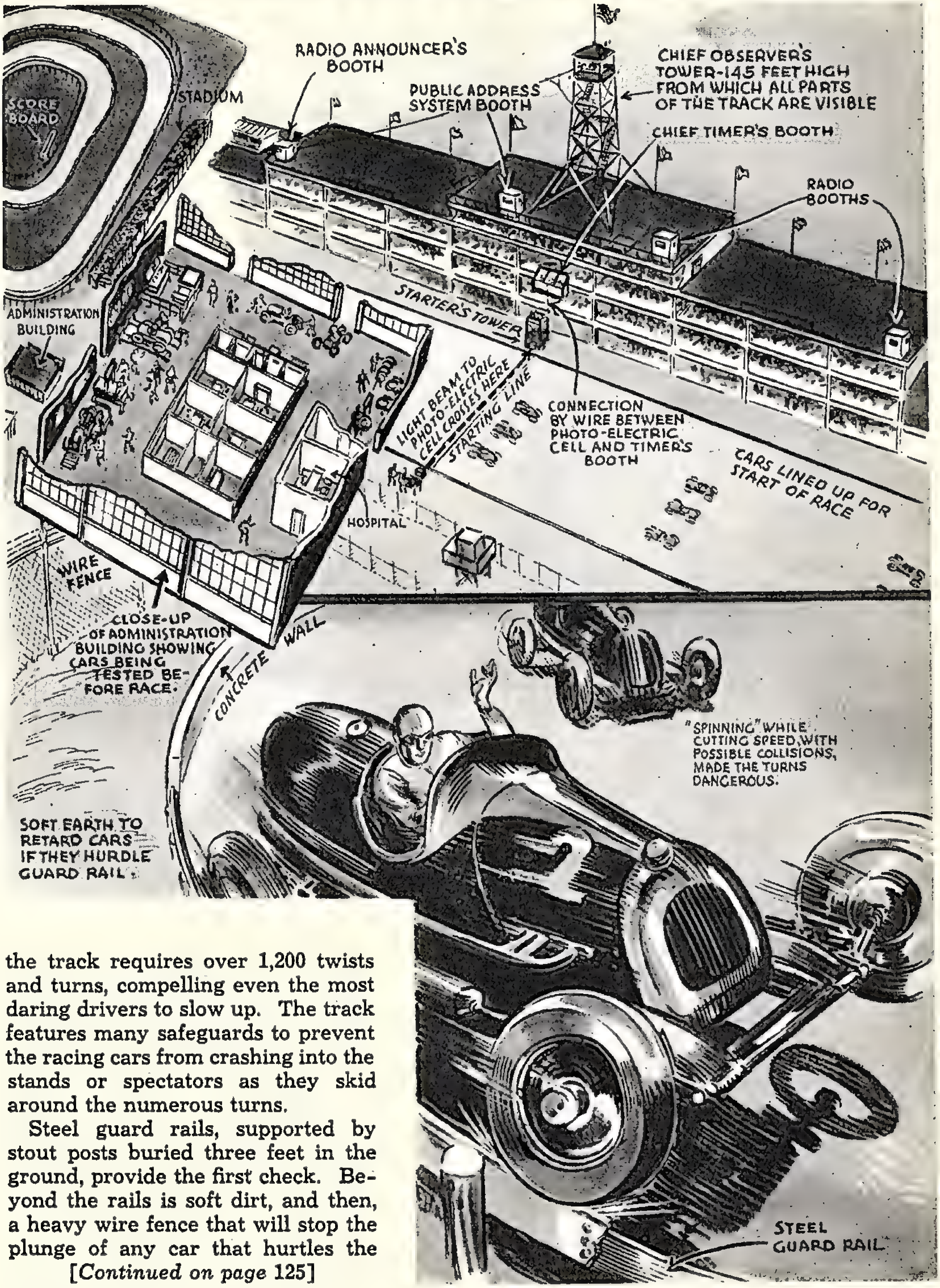
4 ITALIAN ALFA-ROMEO CARS WERE ENTERED. EACH CAR USED ABOUT 89.3 GALLONS OF GASOLINE AND 2 GALLONS OF OIL

80 SPARE TIRES AND 38 CASES OF SPARE PARTS WERE BROUGHT OVER

ROOSEVELT RACEWAY, located at Westbury, L. I., is America's newest and most dangerous automobile race track. So dangerous is the four-mile track with its twists and turns that Tazio Nuvolari, of Italy, who won the Vanderbilt Cup and $24,000 of the $60,000 prize money at the opening race last Columbus Day, averaged only 65.998 m.p.h. in his Alfa-Romeo racer although he attained speeds of 145-150 m.p.h. on the straightaways.

The average 75-mile race staged at

AUTO RACE TRACK


SCORE BOARD
STADIUM
RADIO ANNOUNCER'S BOOTH
PUBLIC ADDRESS SYSTEM BOOTH
CHIEF OBSERVER'S TOWER-145 FEET HIGH FROM WHICH ALL PARTS OF THE TRACK ARE VISIBLE
CHIEF TIMER'S BOOTH
RADIO BOOTHS
ADMINISTRATION BUILDING
STARTER'S TOWER
LIGHT BEAM TO PHOTO-ELECTRIC CELL CROSSES HERE
STARTING LINE
CONNECTION BY WIRE BETWEEN PHOTO-ELECTRIC CELL AND TIMER'S BOOTH
CARS LINED UP FOR START OF RACE
HOSPITAL
WIRE FENCE
CLOSE-UP OF ADMINISTRATION BUILDING SHOWING CARS BEING TESTED BEFORE RACE.
CONCRETE WALL
"SPINNING" WHILE CUTTING SPEED, WITH POSSIBLE COLLISIONS, MADE THE TURNS DANGEROUS.
SOFT EARTH TO RETARD CARS IF THEY HURDLE GUARD RAIL.
STEEL GUARD RAIL

the track requires over 1,200 twists and turns, compelling even the most daring drivers to slow up. The track features many safeguards to prevent the racing cars from crashing into the stands or spectators as they skid around the numerous turns.

Steel guard rails, supported by stout posts buried three feet in the ground, provide the first check. Beyond the rails is soft dirt, and then, a heavy wire fence that will stop the plunge of any car that hurtles the

[*Continued on page* 125]

AERIAL MEDICAL SERVICE

The Australian Aerial Medical Service maintains ambulance planes like this for bringing sick or injured colonists from isolated interior regions to medical centers. Doctor, pilot and wireless operator accompany each plane.

A traveling official using a portable field wireless set to summon medical aid from Cloncurry, Queensland, over 600 miles away. The masts held by the natives serve as an aerial. Power for sending the message is produced by using the pedal arrangement generator like a bicycle.

With power from pedaled generators, radio sets are used to summon or receive medical aid. Up to 200 miles, radiophone conversation is used. Over 200 miles, Morse code dots and dashes are sent out by an automatic keyboard when proper key is pressed. This device eliminates necessity for knowing codes.

AIRCRAFT and wireless are being used to wipe out the medical dangers of isolation for large numbers of Australia's bush settlers located in the interior. To bring them speedy medical aid or advice, the Australian Aerial Medical Service utilizes several ambulance type airplanes, hundreds of cheap wireless sets, and four doctors.

The wireless sets, operated by responsible persons in each small settlement, summon the doctors' aid or advice from the nearest coast medical centers when needed. A single doctor flys as much as 20,000 miles in one year, visiting hundreds of patients, and holding group consultations at settlements.

Television Phone Links Two German Cities

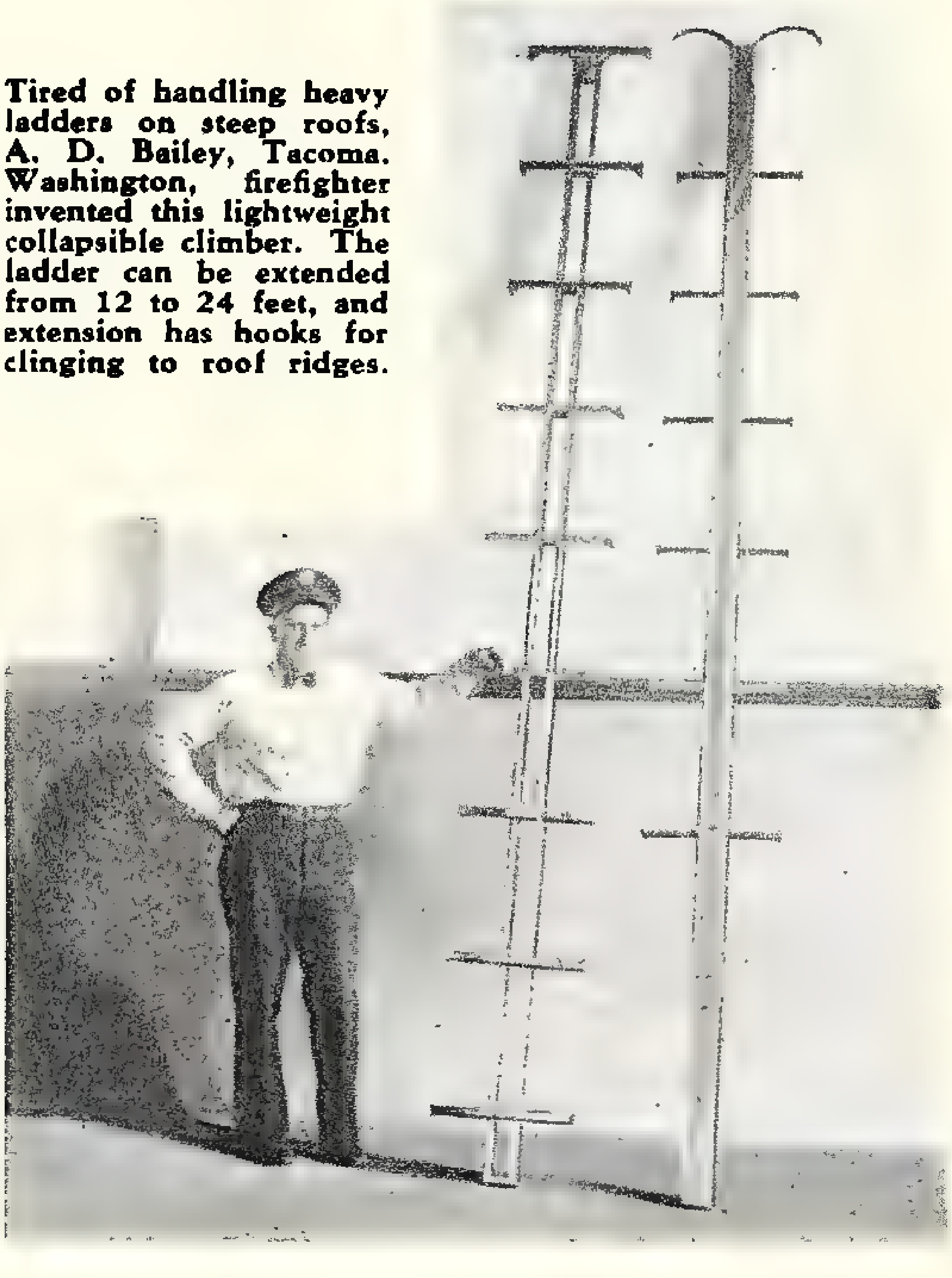
TELEVISION - TELEPHONE service having proved successful between Berlin and Leipzig, plans are being made to make the service available all over Germany.

Both persons can see and hear each other. A flicker type image of the other party appears on the panel directly in front of the person using the phone, while the sending apparatus, behind the screens on either side, records his movements and image. Work will start shortly on a similar service between New York and Philadelphia.

While talking to a friend 168 miles away in Leipzig, this Berliner is watching him, too, as his image appears on the screen in front. The television-telephone works both ways.

Ladder Aids Fire Laddie

Tired of handling heavy ladders on steep roofs, A. D. Bailey, Tacoma, Washington, firefighter invented this lightweight collapsible climber. The ladder can be extended from 12 to 24 feet, and extension has hooks for clinging to roof ridges.



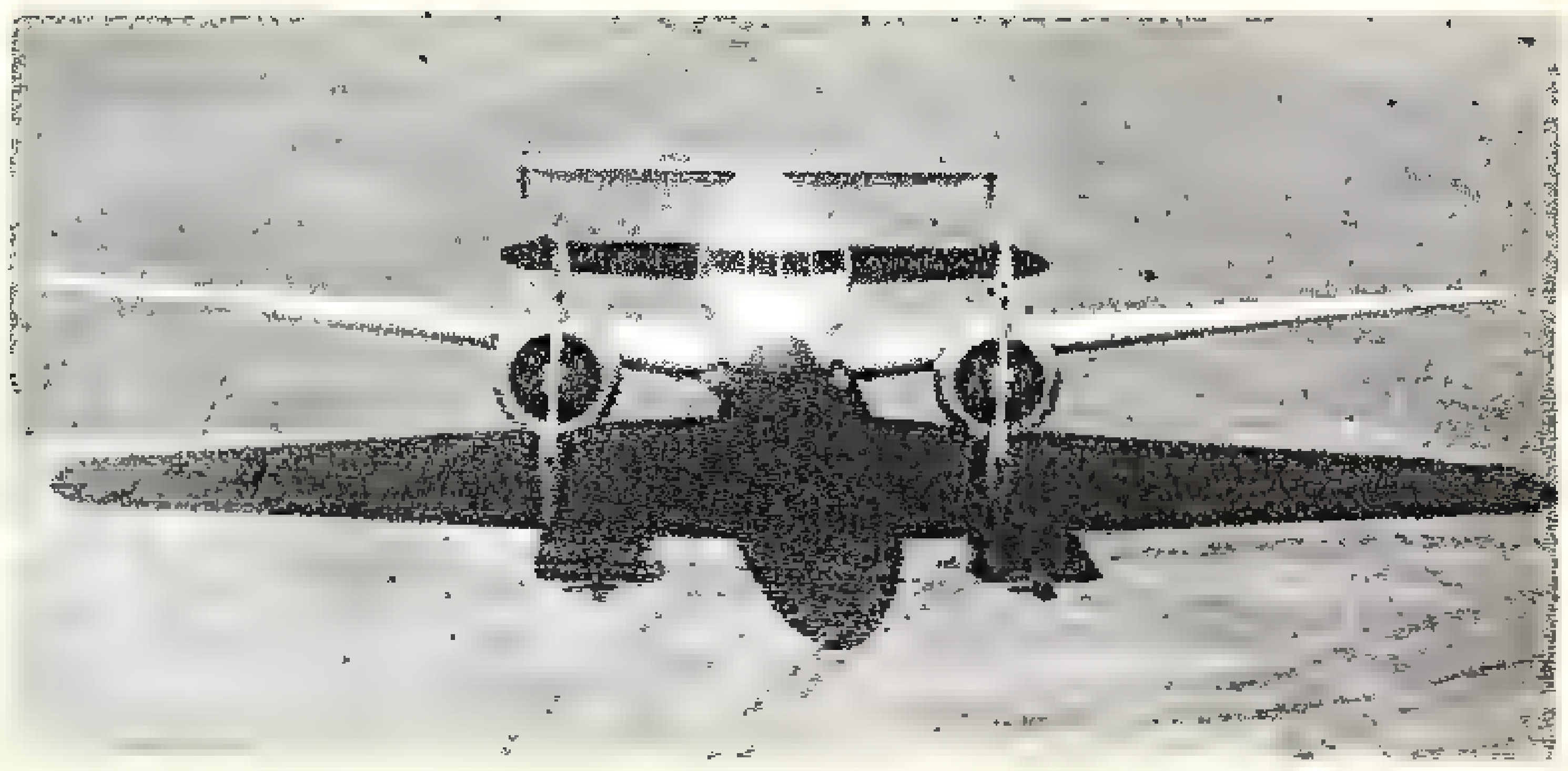
CONFRONTED with the problem of handling heavy ladders on steep roofs where the work required means of reaching beyond the 12-foot range of the standard ladder, Fireman A. D. Bailey of Tacoma, Washington, has invented a collapsible ladder which has been acclaimed and adopted by the Fire Department of his city. The ladder, of stainless steel, is 12 feet high, but pulls out to reach 22 feet. It can be swung from roof ridges.

Called Fastest Transport

POWERED with two 450 h.p. Pratt & Whitney Wasp Juniors, Lockheed's new Model 12, is claimed by her makers in Burbank, Calif., to be the fastest commercial transport in service on the American airways.

Built to carry six passengers and two pilots, the new ship is structurally similar to the famous Lockheed Electra, although somewhat slimmer in line, about the nose and in the fuselage. The ship's maximum speed at sea level is 214 m.p.h., but at an altitude of 5,000 feet, she hums along at 226 m.p.h. Her cruising speed is 213, and the cruising range, with 200 gallons of gas, is 900 miles.

According to those who have ridden in the new model, she takes off rapidly, climbs at a phenomenal rate, and handles well at both low and high speeds. Landing, with flaps down serving as air brakes, the ship comes to a stop with a very short ground run.



New twin-engine model transport which her builders claim is America's fastest commercial plane. Built to carry six passengers and two pilots, its cruising speed is 213 m. p. h.

Sound Tricks of

by Earl Theisen

Illustrated by Walt Disney

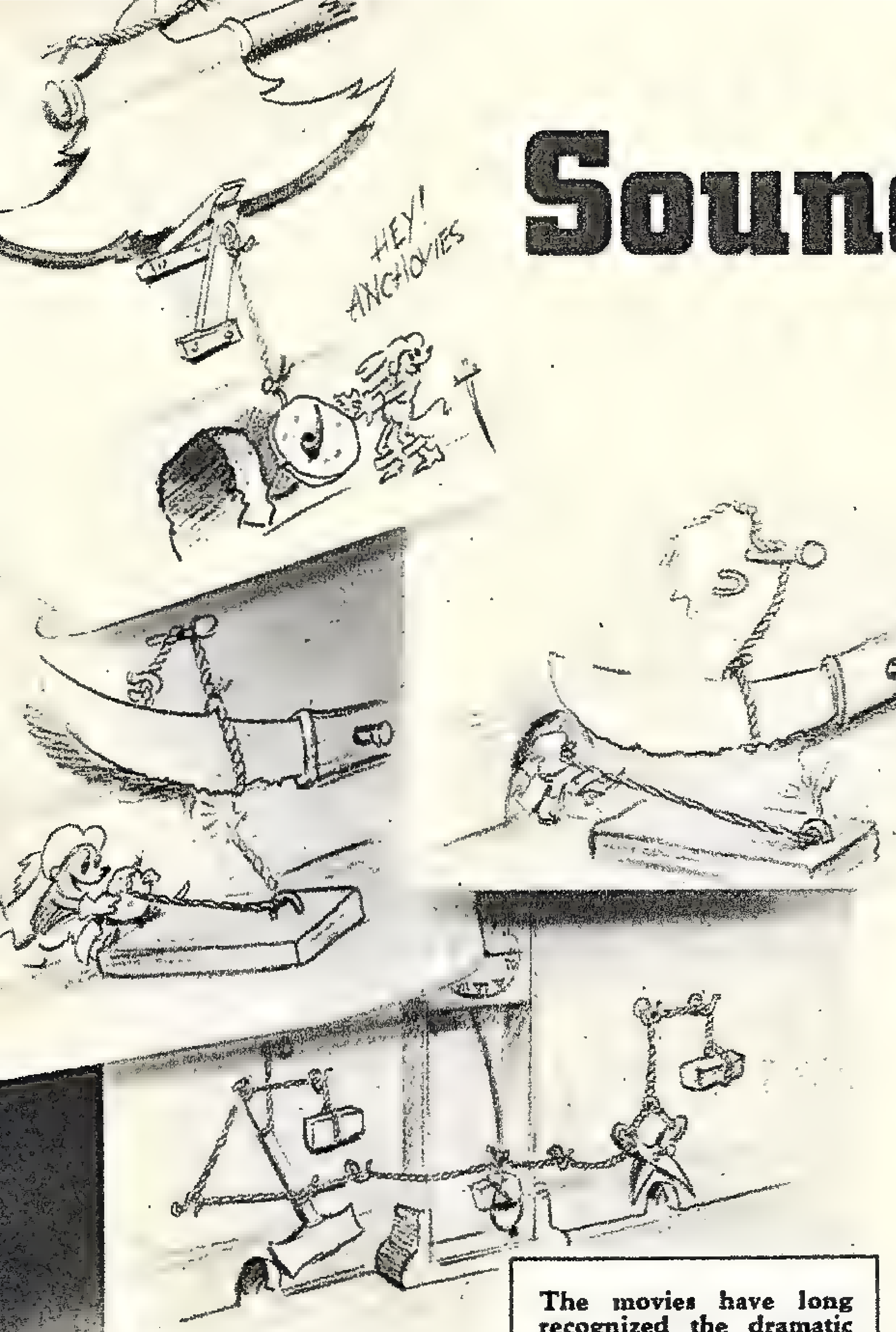
Squeaks, squawks, oinks and music—it's another animated cartoon hit, set to music in a brand new way. Read how the hay baler joins a symphony.

MUSIC and noises in the animated cartoon interpret the action of the story. The narrative theme of the music and what is called the "sound effects" punctuates and emphasizes the story.

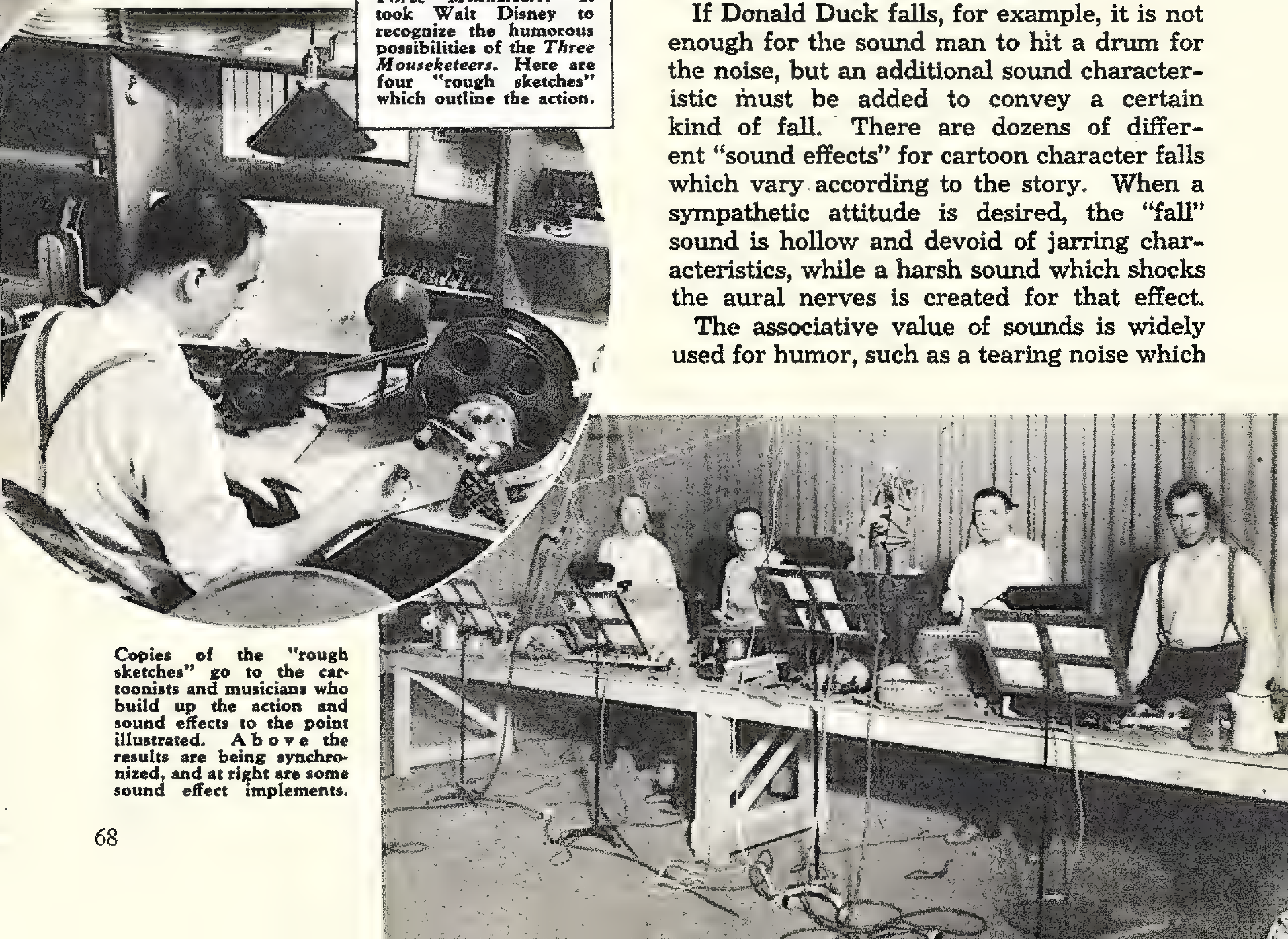
By playing on the aural nerves with symbolic sounds and noises the psychological reaction of the audience is controlled and varied according to the dramatic and emotional needs of the cartoon story.

If Donald Duck falls, for example, it is not enough for the sound man to hit a drum for the noise, but an additional sound characteristic must be added to convey a certain kind of fall. There are dozens of different "sound effects" for cartoon character falls which vary according to the story. When a sympathetic attitude is desired, the "fall" sound is hollow and devoid of jarring characteristics, while a harsh sound which shocks the aural nerves is created for that effect.

The associative value of sounds is widely used for humor, such as a tearing noise which

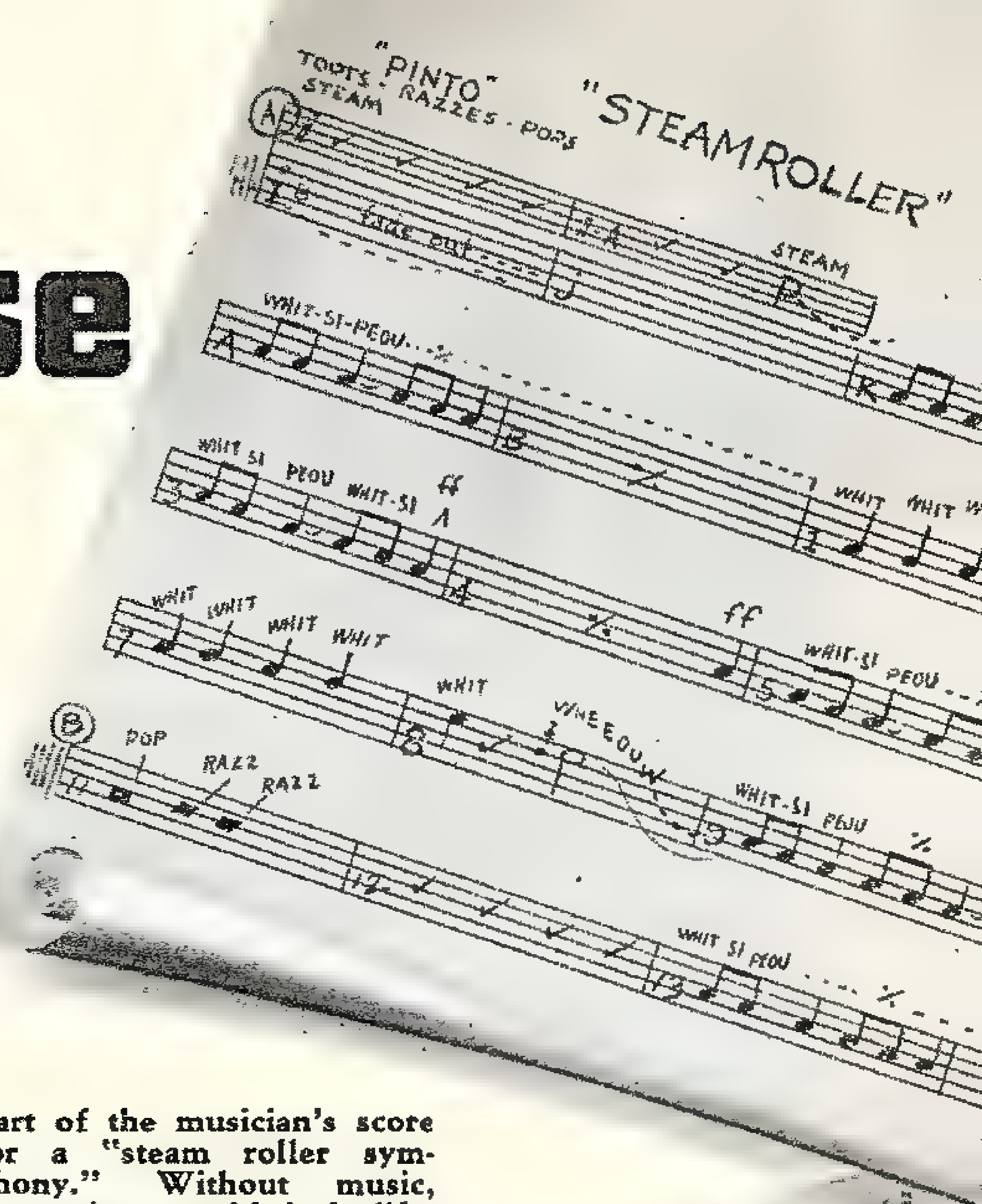


The movies have long recognized the dramatic possibilities of Dumas' *Three Musketeers.* It took Walt Disney to recognize the humorous possibilities of the *Three Mouseketeers.* Here are four "rough sketches" which outline the action.



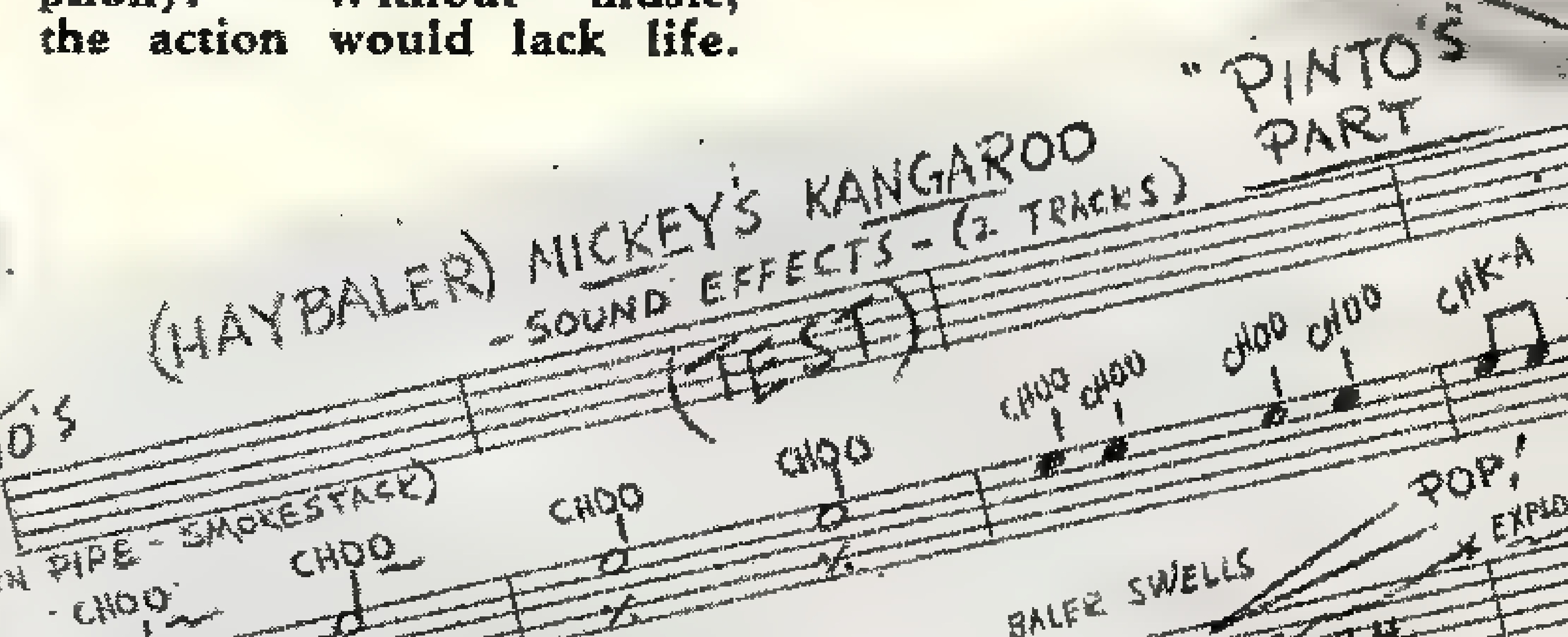
Copies of the "rough sketches" go to the cartoonists and musicians who build up the action and sound effects to the point illustrated. Above the results are being synchronized, and at right are some sound effect implements.

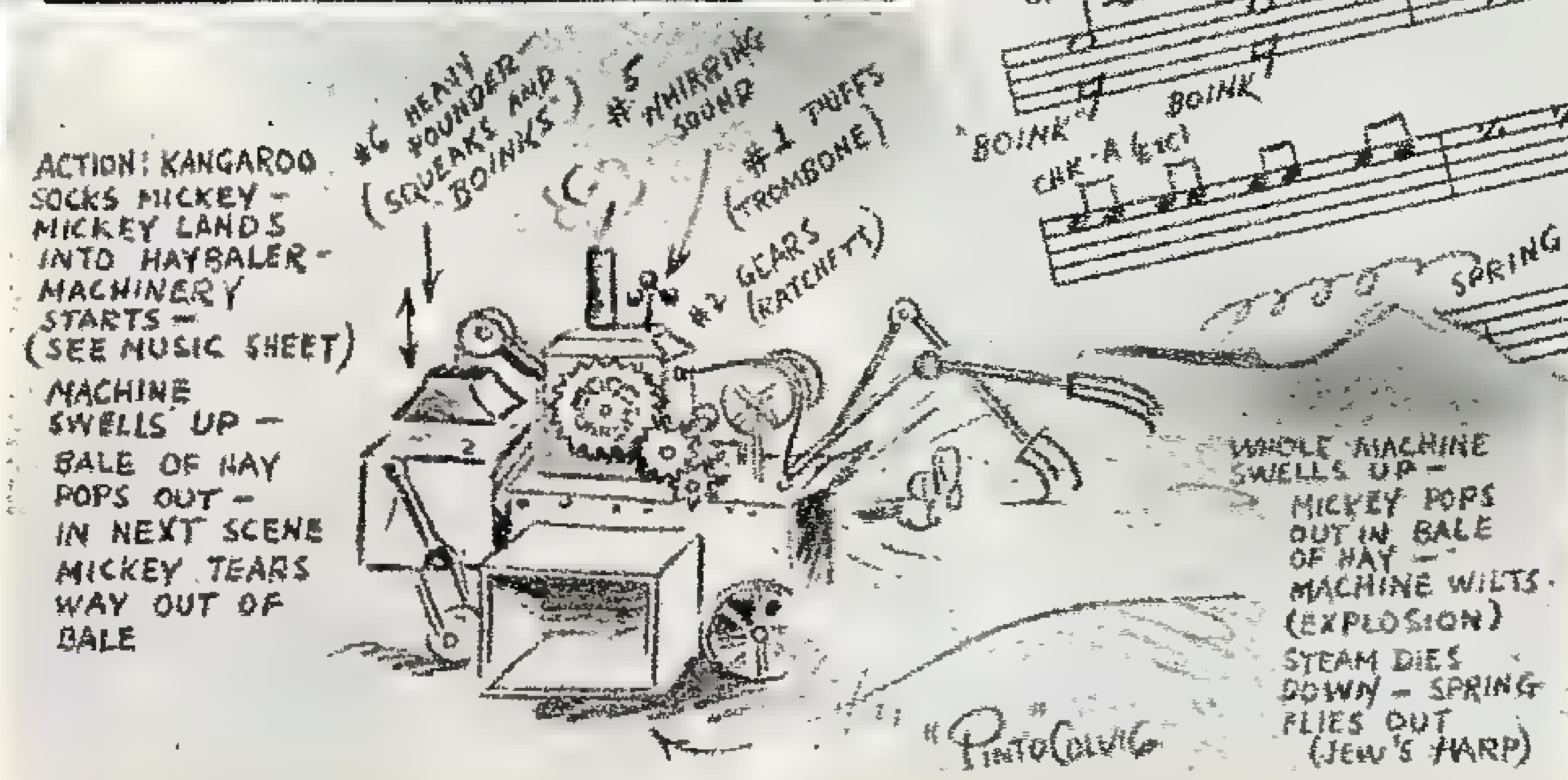
Mickey Mouse


"PINTO"
TOOTS STEAM
RAZZES - POPS
"STEAMROLLER"
STEAM
WHIT-SI-PEOU
WHIT SI PEOU WHIT-SI
WHIT WHIT
WHIT WHIT WHIT WHIT
WHIT
WHEEOUW
WHIT-SI PEOU
POP RAZZ RAZZ
WHIT-SI PEOU
WHIT SI PEOU

Part of the musician's score for a "steam roller symphony." Without music, the action would lack life.

Walt Disney tempts a penguin into conversation with a strip of fish. Once the penguin begins to talk, his voice is recorded for movie cartoon use. This bird is heard in the film, *Peculiar Penguins*. All sorts of tricks are needed to persuade various animals to "talk."


"PINTO'S PART"
(HAYBALER) MICKEY'S KANGAROO
- SOUND EFFECTS - (2 TRACKS)
(TEST)
(IN PIPE - SMOKESTACK)
CHOO CHOO CHOO CHOO
CHOO CHOO CHOO CHOO CHK-A
POP!
BALER SWELLS
"BOINK" BOINK
CHK-A (etc)
SWISSSSSHHH (STEAM)


ACTION: KANGAROO SOCKS MICKEY - MICKEY LANDS INTO HAYBALER - MACHINERY STARTS - (SEE MUSIC SHEET)
#6 HEAVY POUNDER (SQUEAKS AND BOINKS)
#5 WHIRRING SOUND
#1 PUFFS (TROMBONE)
#2 GEARS (RATCHETS)
MACHINE SWELLS UP - BALE OF HAY POPS OUT - IN NEXT SCENE MICKEY TEARS WAY OUT OF BALE
WHOLE MACHINE SWELLS UP - MICKEY POPS OUT IN BALE OF HAY - MACHINE WILTS - (EXPLOSION) STEAM DIES DOWN - SPRING FLIES OUT (JEW'S HARP)
"PINTO" COLVIG

The "rough sketch" at left was given to "Pinto" Colvig for the musical interpretation. Each moving part was turned into sound as shown on finished score above.

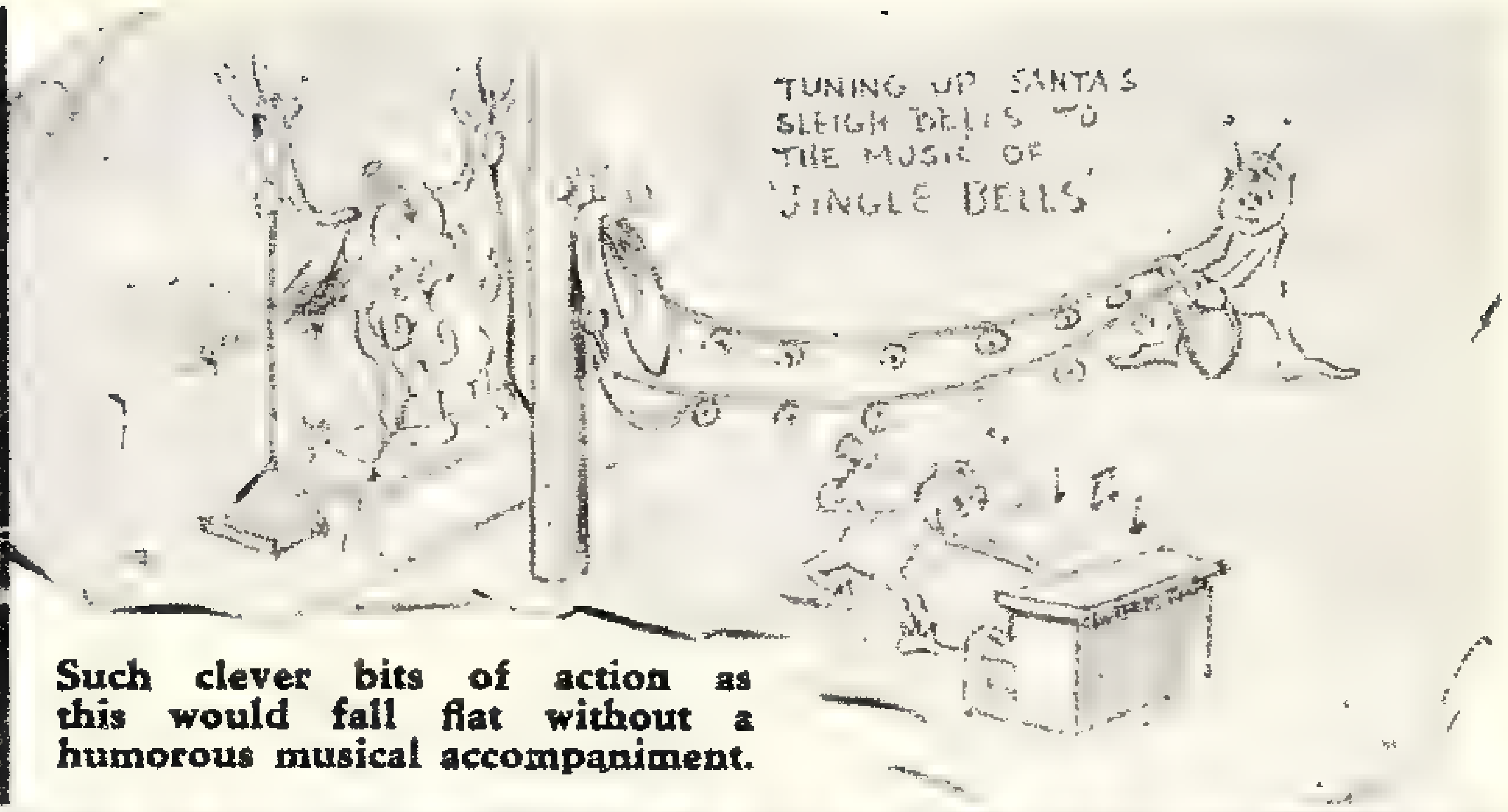
accompanies the falling of a character. For humorous responses the "sound effect" is often caricatured and distorted. An example of this was the tire skidding noise used in "The Tortoise and the Hare" when the fast moving rabbit slid to a stop.

Through study and experimentation Walt Disney and his engineers have found that by introducing music or various sounds and noise frequencies into the cartoon, the response of the audience is varied and controlled. By combining noises of certain pitches or tempos the psychological values of the cartoon music is emphasized in keeping with the story requirements.

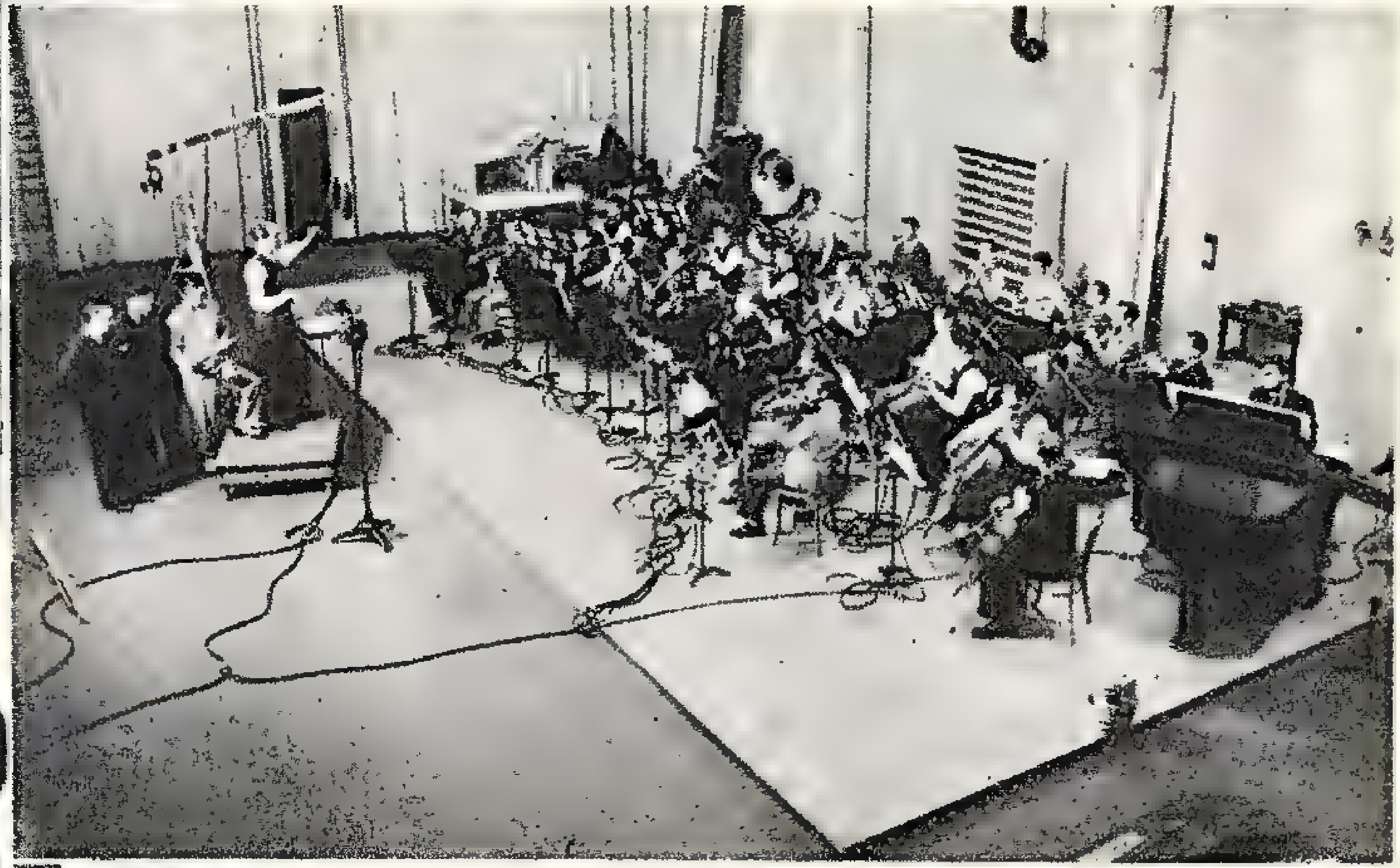
Sound of sixteen cycles is deep toned and may be used for conveying heavy or depressing moods, whereas the sound of a higher frequency is what William Garity, Chief Engineer at Walt Disney's, calls the "pain sensitive region." Noises of this higher pitch make the hearer alert and may be carried to the point of actually causing distress, such as a "file on glass" noise. The average ear is very sensitive to sounds of 2,000 or 3,000 cycles and unless some sound of this pitch is added to the cartoon background noise, the audience is less responsive to the effects.

Stories are told by sound. "Pinto" Colvig, who wrote the lyrics for "The Three Little Pigs" and who does many of the sound "imitations" for automobiles, airplanes, or machines when they assume human characteristics, is able to convey a whole story by sound. For example, in a recent picture he caricatured a steam roller at work by suitable noises, pops, puffs, razzes, and wheezes. Vocally, without the aid of mechanical de-

A last minute conference before recording. Disney and his director talk it over with the conductor.


TUNING UP SANTA'S SLEIGH BELLS TO THE MUSIC OF 'JINGLE BELLS'

Such clever bits of action as this would fall flat without a humorous musical accompaniment.



The Silly Symphony orchestra on the special resonator floor which is used for special effects. Fifty or sixty hours of rehearsal are required in the production of the average film.

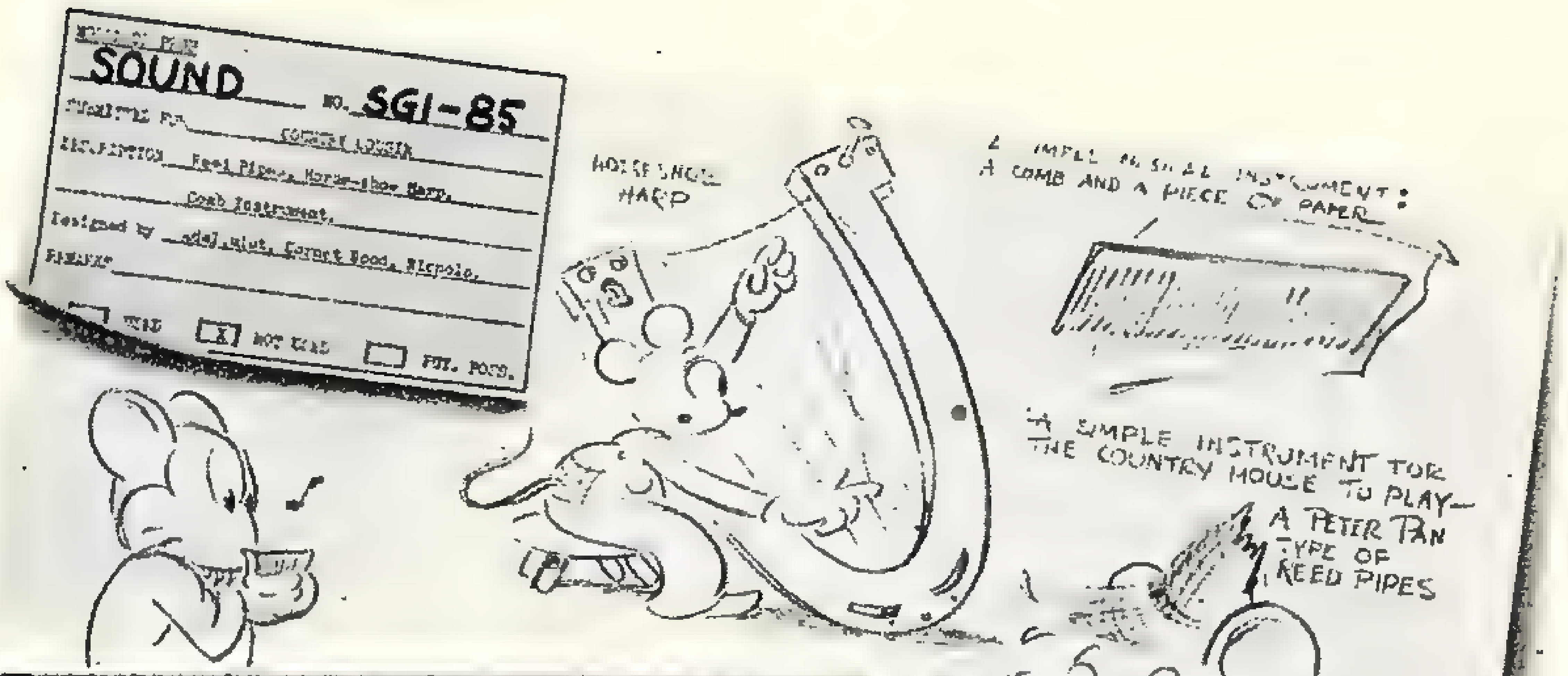
In the Monitor room the director, head engineer and Disney listen to the sounds produced on the sound stage. Here sound is reproduced exactly as it will be heard in the theater.

vices, he depicted a narrative episode of a very busy steam roller that worked hard, then got tired and stopped. To do this he made a picture on paper of the sound by working out the suitable suggestive sounds and inflections which he set down on music paper according to the desired effects, tonal range, and tempo which brought to life the pen and ink steam shovel. "Pinto" Colvig with the aid of a trombone and vocal sounds can make an airplane do all sorts of antics. Real airplane sounds cannot be controlled to musical tempo for cartoon effects.

Each sound in a cartoon film is the result of much thought. Such things as bugs, all sizes, getting the hiccoughs which happened in "Mickey's Garden" when Mickey sprayed them with "bug eliminator" required hours of rehearsal before the sound was recorded. For some sounds hours are required in rehearsal, and fifty or sixty hours are required to make the sound for the average cartoon.

There are six men and women under contract at Disney's who do nothing but mimic and imitate many sounds. The distorted Donald Duck conversation and singing is done entirely by mouth without mechanical aid, as is that of Madame Clara Cluck, Mickey, and the other characters. Walt, himself, does the Mickey chatter. Much of the "imitator's" time is spent in inventing cartoon noises.

For cartoon kisses, the "imitator" kisses his own hand or arm. For a Mickey-Minnie embrace, the "imitator" kisses the heel of his hand, while a tiny bug osculation is obtained from his thumb. A moist noisy smack is gained by kissing his arm at the elbow bend. Cartoon embraces are not as emotional as they are humorous because of the caricatured sound.



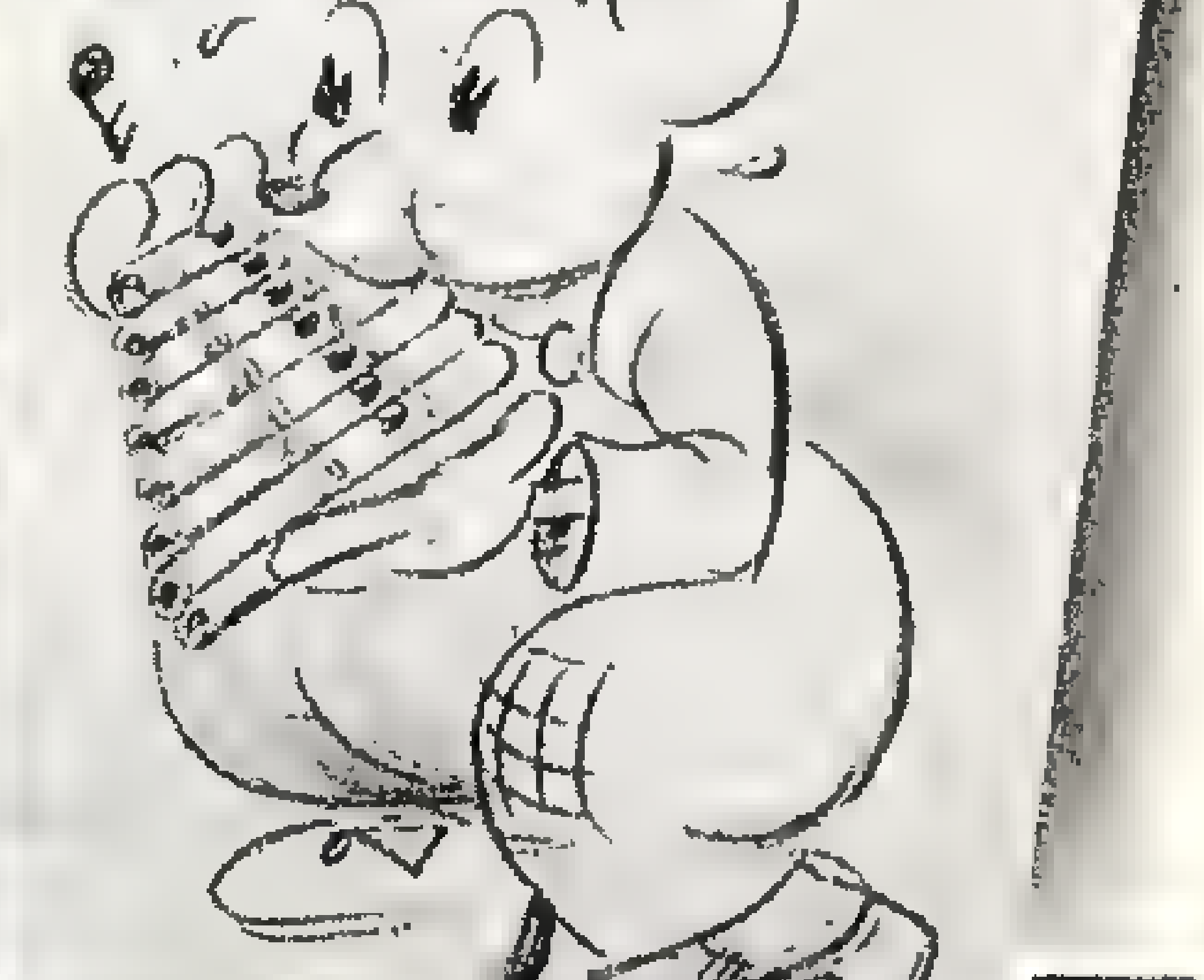
SOUND No. SGI-85

Reed Pipes, Horse-shoe Harp,

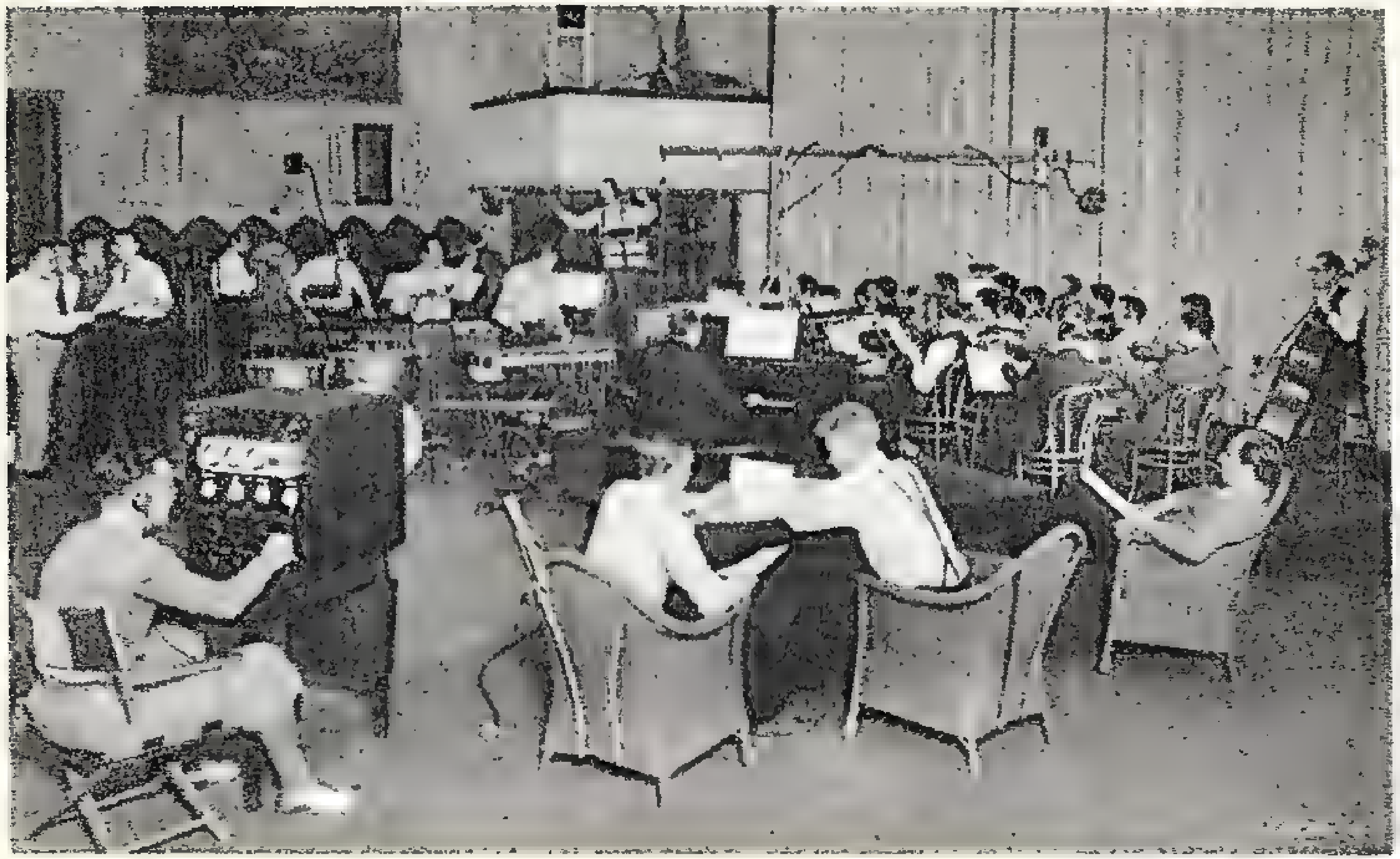
Comb Instrument.

☐ USED ☒ NOT USED ☐ FUT. POSS.

HORSESHOE HARP
A SIMPLE MUSICAL INSTRUMENT: A COMB AND A PIECE OF PAPER
A SIMPLE INSTRUMENT FOR THE COUNTRY HOUSE TO PLAY—
A PETER PAN TYPE OF REED PIPES



Each gag used in a Silly Symphony is selected from hundreds of others. The gag department contains thousands of inventions which will never be patented, for they operate only upon film for the amusement of theater patrons. Here are some ideas submitted for *The Country Cousin* but not used. They will be filed according to description on the card.



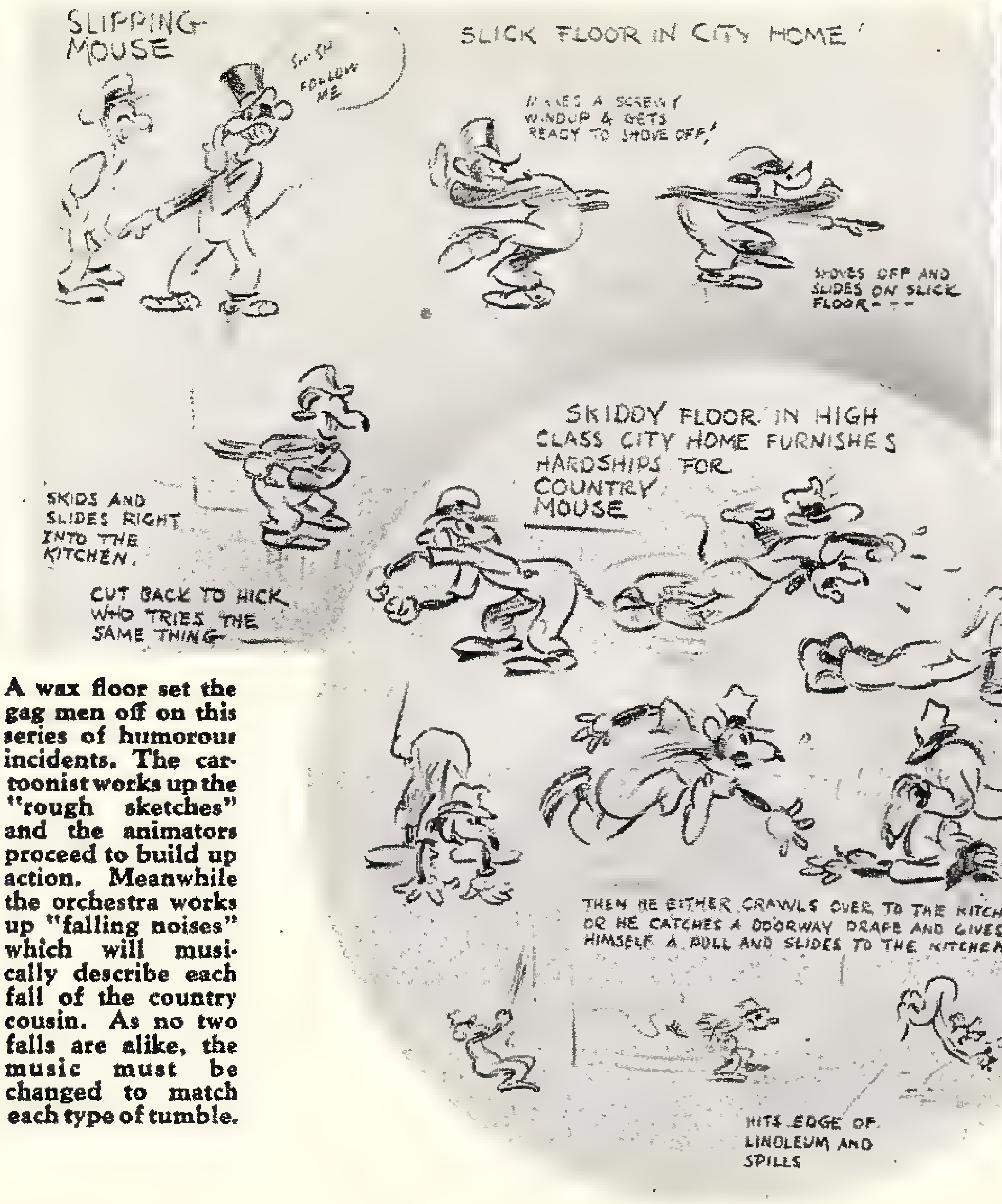
Here is a Silly Symphony in full swing, from the quartet at left and sound effects men at center to the orchestra at right. The panel at left "mixes" and blends the various sounds.

Now that music is carrying a big part of the action, the cartoon animator times his action to so many drawings per beat of music. The number varies according to the musical time.

Recently a sound of a cartoon character talking under water was needed. After much experimentation, the sound was made by one of the "imitators" who talked while a common garden hose ran a stream of water into his mouth.

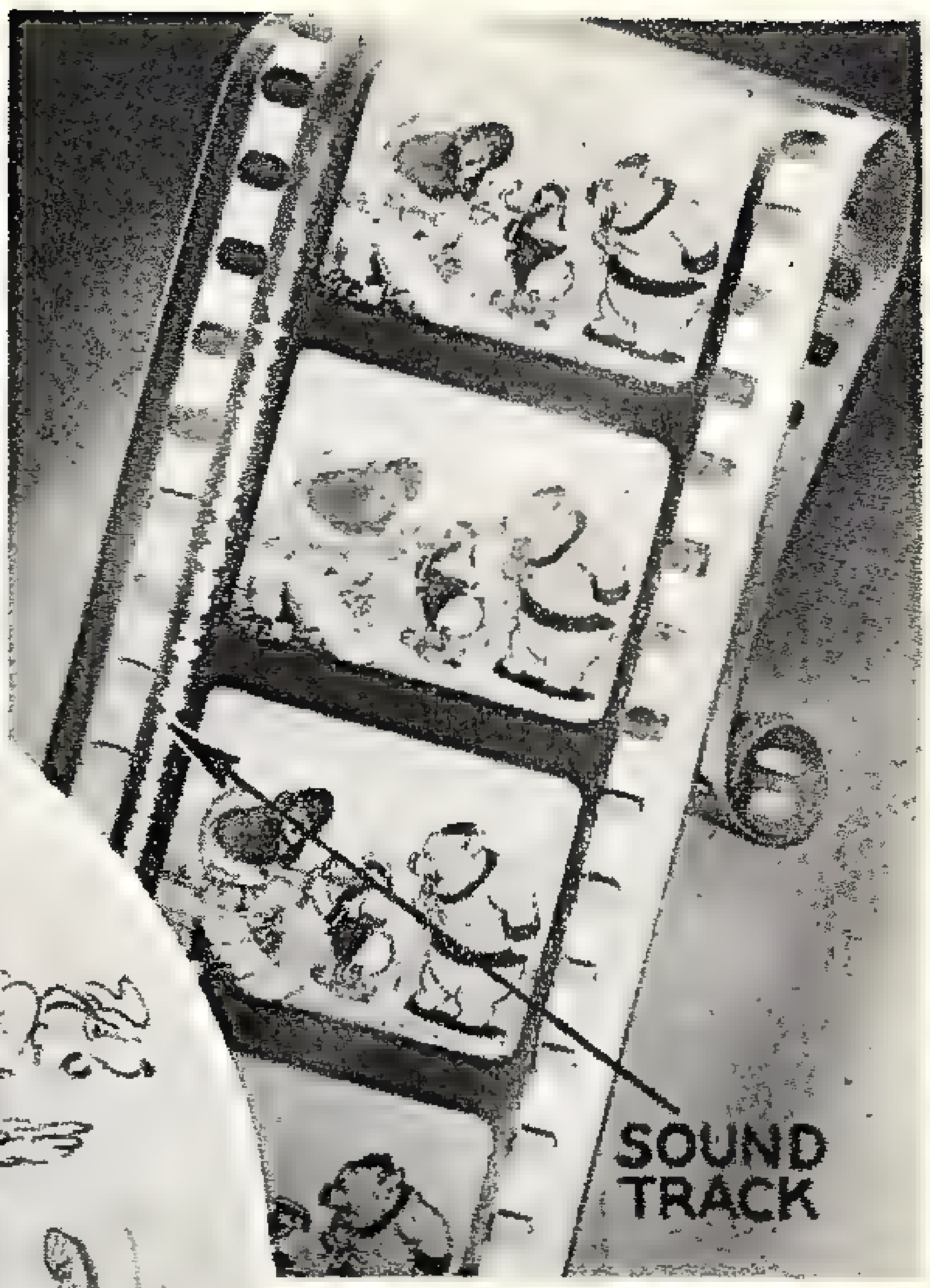
While much of the sound is made vocally, mechanical devices and various materials are also used. One kind of slow-burning fire noise is made by crinkling cellophane, while a more crackling fire sound is gained by twisting a bundle of bamboo strips. A train getting under way is obtained by a tin can in which is a handful of gravel. By shaking the can and gravel up and down, the noise of a real railroad train is created. Another "train noise maker" consists of a number of wires held at one end by hand. The other end of the wires is rubbed over a sheet of corrugated tin. Thunder claps of various kinds are obtained by cowhides and sheets of metal, while wind noises are made by rapidly revolving a wheel with wire spokes. Another hollow ghostly wind noise is made by revolving a wooden drum against taut silk. Rain noises are made in a drum in which are stretched piano wires. Particles of glass dropping against the wire when the drum is revolved creates the sound.

Lion roars are obtained from a barrel over which is stretched, drumlike, a piece of skin. Into the center of this skin is tied a heavy piece of cat-gut and the sound is made by sliding a rosin coated piece of leather down the cat-gut. Dog barks are made by similar though smaller contraptions. Various dog bark pitches are made by using assorted sizes of tin cans. The dog "language" is produced by the manner in which the rosined leather is slid on the string. Often ordinary tools such as egg beaters which furnish machinery noise, derby hats which supply thumping or more exactly a "plop in" sound, and so forth are used for suitable noises.



SLIPPING MOUSE
Sh-sh FOLLOW ME
SLICK FLOOR IN CITY HOME!
MAKES A SCREWY WINDUP & GETS READY TO SHOVE OFF!
SHOVES OFF AND SLIDES ON SLICK FLOOR - - -
SKIDS AND SLIDES RIGHT INTO THE KITCHEN.
CUT BACK TO HICK WHO TRIES THE SAME THING
SKIDDY FLOOR IN HIGH CLASS CITY HOME FURNISHES HARDSHIPS FOR COUNTRY MOUSE
THEN HE EITHER CRAWLS OVER TO THE KITCHEN OR HE CATCHES A DOORWAY DRAPE AND GIVES HIMSELF A PULL AND SLIDES TO THE KITCHEN
HITS EDGE OF LINOLEUM AND SPILLS

A wax floor set the gag men off on this series of humorous incidents. The cartoonist works up the "rough sketches" and the animators proceed to build up action. Meanwhile the orchestra works up "falling noises" which will musically describe each fall of the country cousin. As no two falls are alike, the music must be changed to match each type of tumble.



SOUND TRACK

The completed film looks like this. The sound track has been co-ordinated with the action, and upon that narrow strip depends as much of the success of the production as upon the pictures. These three frames reveal the tremendous amount of detail necessary to show Donald Duck accepting a lollypop. Thousands more are needed to complete the entire production.

For "squirrel conversation" a cork is twisted in a bottle with a "cartoon technique" in such a way that various meanings are conveyed. The squirrels may be made to seem excited, in love, or just chatting.

The sound stages where the recording is done are constructed of hard surfaced plaster board lined with blanket layers of mineral wool, felt padding, and matting interspersed with air pockets which aid in "damping" extraneous sounds. Thick layers of felt padding and carpeting are laid on the floor. There are two stages; one of which is entirely sound-proofed, or "damped," while a second stage is "live" in that it permits echos to reach the microphone.

Many devices are specially constructed in order that certain sound frequencies are dampened so the "imitator" has a better control over the pitch and volume of the noise. Special resonators in the pianos, doors set in elaborate resonating jams so "door-closing" noises may be made for cartoon purposes, and many other constructions are necessary.

Even the Silly Symphony orchestra is set in a special resonator made of maple wood because of a required resonating quality of this wood. The resonator which gives a richness to the tone is built in the form of a large tapering loud speaker on one of the sound stages. It is suspended in a floating arrangement so as to eliminate echo vibration. Walt Disney, who knows the dramatic value of various sounds and musical tempos, has constructed many novel devices in order to produce the necessary sounds.

The background orchestral music is valuable in directing the emotional responses of the audience, and is used to elaborate on the cartoon story by what Walt Disney prefers to call the "earical illusion." The psychological reactions of the theatre audience to suggestive noise, musical tempo and tune are carefully considered in composing musical scores for the animated cartoon.

The emotional effect is gained not so much by the music itself as by the manner in which it is played and the noise effects instilled into the orchestration. In connection with the villain, for example, an annoying "out of step" sound is cleverly interwoven into the background music melody is "timed" into the musical effects.

[*Continued on page* 122]

Electrical Stethoscope Helps Doctors Diagnose

Through the use of this electrical stethoscope, developed by Western Electric Company, physicians can hear heart murmurs formerly impossible to detect with ordinary stethoscope.

AN ELECTRICAL stethoscope that enables physicians to greatly amplify heart sounds in making a diagnosis has been devised. It features a filter circuit that isolates and accentuates murmur sounds so significant and yet so difficult to detect with an ordinary acoustical stethoscope.

The electrical stethoscope, developed by the Western Electric Company, is in reality an amplifier with a special microphone which is applied to the patient's body over the heart. The faint impulses picked up by the microphone are fed into the small, but powerful, amplifier and are magnified to desired degree.

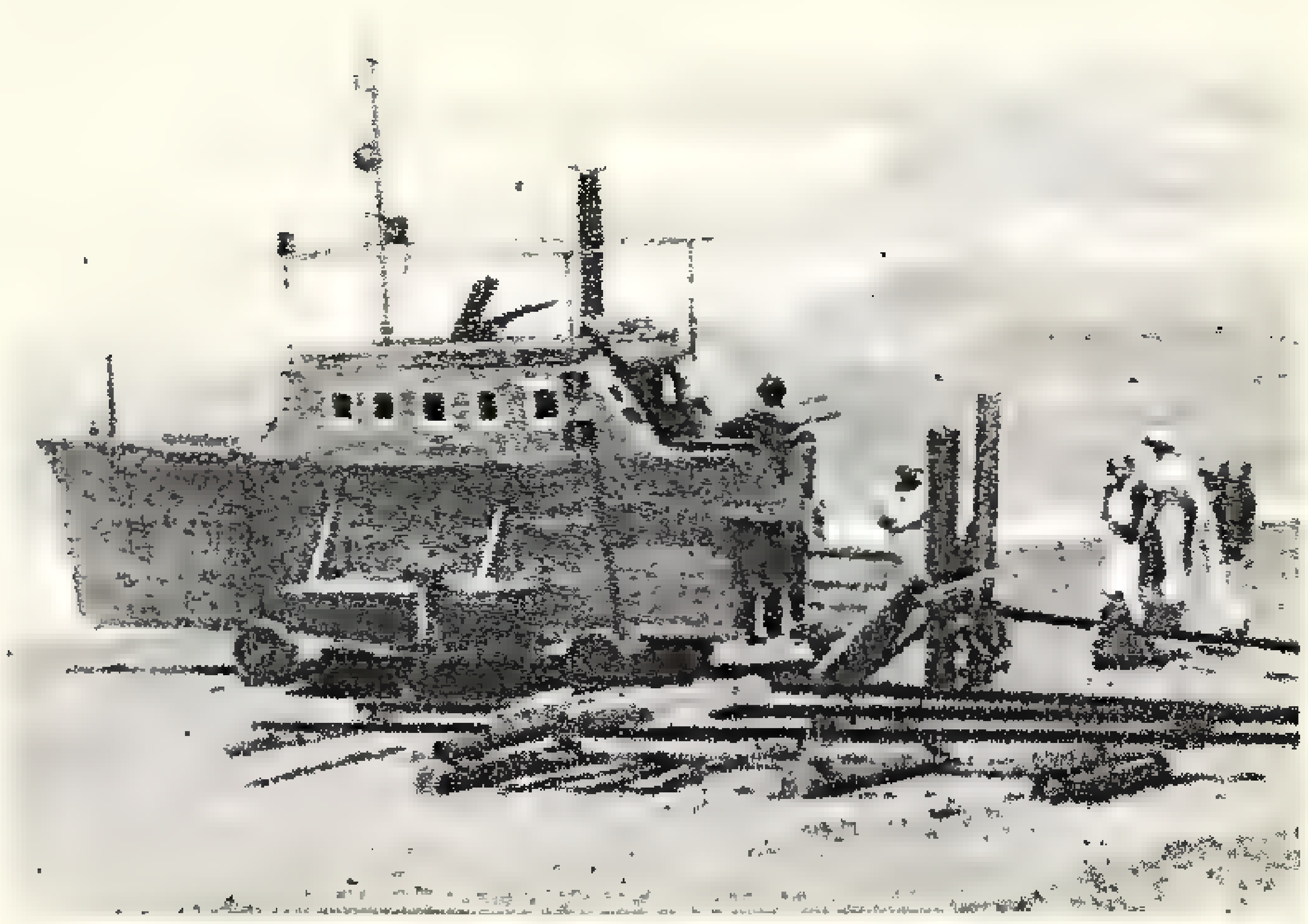
The output of the amplifier passes into a receiver arranged for attachment to the earpiece of the conventional type of stethoscope which the examining physician applies to his ears in the usual manner. Doctors claim they can now hear internal murmurs that were formerly difficult or impossible to detect.

Device May Stop Crashes

DESIGNED to eliminate railroad grade crossing accidents, a safety device developed by Alfred Huguet, of Barcelona, Spain, is said to have proved its practicability in a test using model trains. An electric eye switch in the locomotive causes the power to shut off if the train approaches within a certain distance of a crossing at which the guard gate has failed to lower.

Left—Alfred Huguet, Spanish inventor, has developed a safety device that may eliminate railroad grade crossing accidents. It can be applied to either steam or electric powered locomotives. Above—Model train used to demonstrate Huguet's device. When train approaches a crossing at which gate has failed to lower, a switch located in the engine cab automatically turns off power and applies the brakes to train wheels.

Boat Devised From Scraps

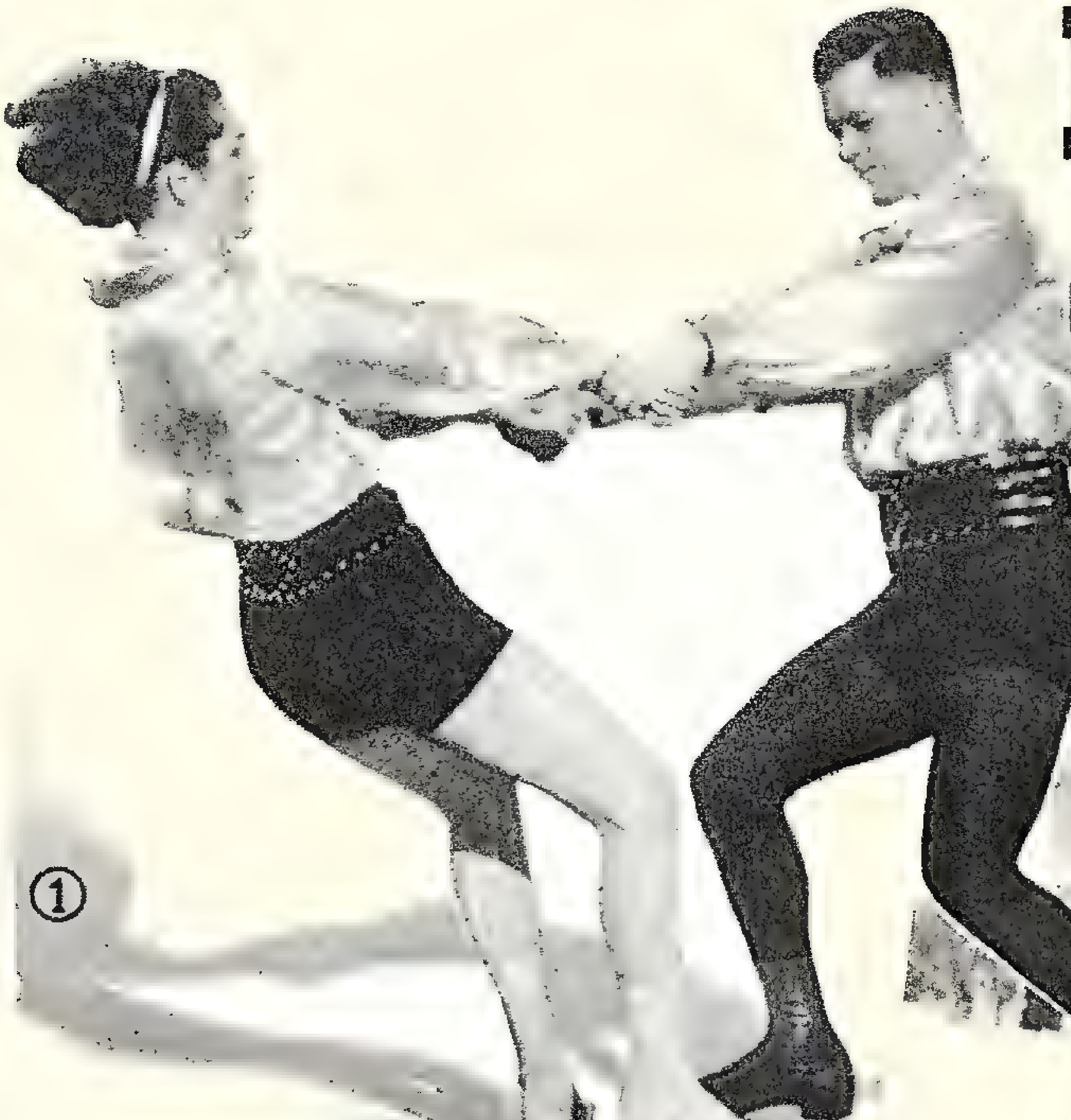


Two beach-combers at Fort Bragg, Calif., will brave the oceans in this queer looking boat. They hope to sail it to Europe. Made of scraps from city dumps, it required ten years to build.

CONSTRUCTED entirely of scrap materials obtained at city dumps, an odd looking boat awaits launching at Fort Bragg, Calif. It was constructed by two beach-combers who hope to sail to Europe in it.

The 25-foot craft required ten years to build and weighs over four tons. More than 15,000 rivets hold it together. A lookout platform atop the cabin is equipped with an old automobile headlight which will serve as a searchlight in an emergency. Boat is now standing on railroad wheels on an improvised track awaiting a calm sea before the beach-combers attempt the start of their hazardous trip.

FANCY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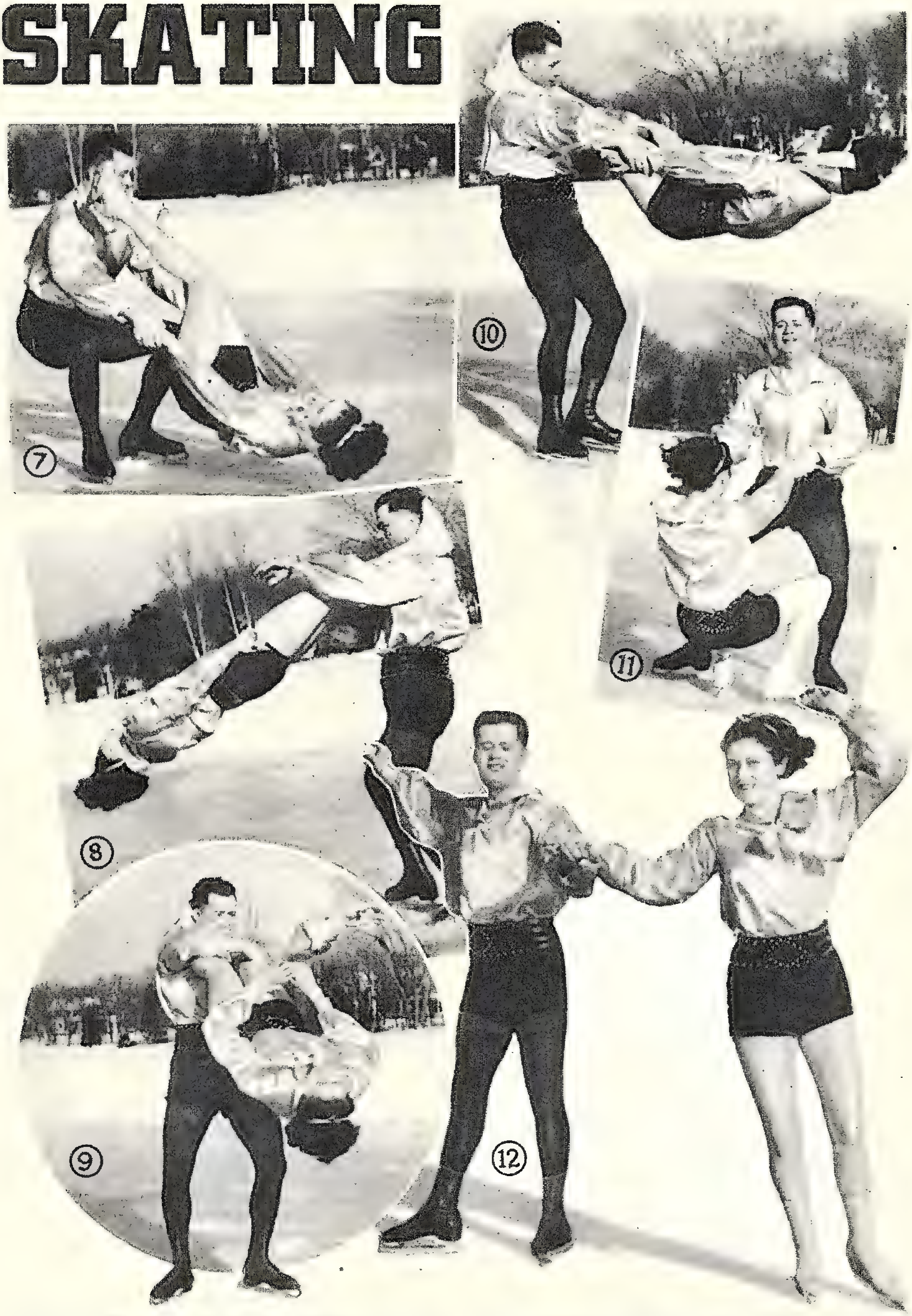
The skill and grace of star ice skating performers is graphically shown in this series of action photographs taken by George Ryan, Minneapolis (Minn.) *Tribune* cameraman. The photos, taken by a super-speed camera, show Norris

SKATING



and Naome Wold going through the evolutions of the "puck spin" at Lake Of The Isles in Minneapolis. Fancy skating calls for a degree of skill and precision second to that of few other activities. Speed, balance, strength, endurance—all are required of those who would perform on the flashing blades. A slip here, a moment's hesitation there, and what started as a graceful exhibition is turned into an awkward, stumbling display. Constant, painstaking practice is necessary.

Sportsmen's

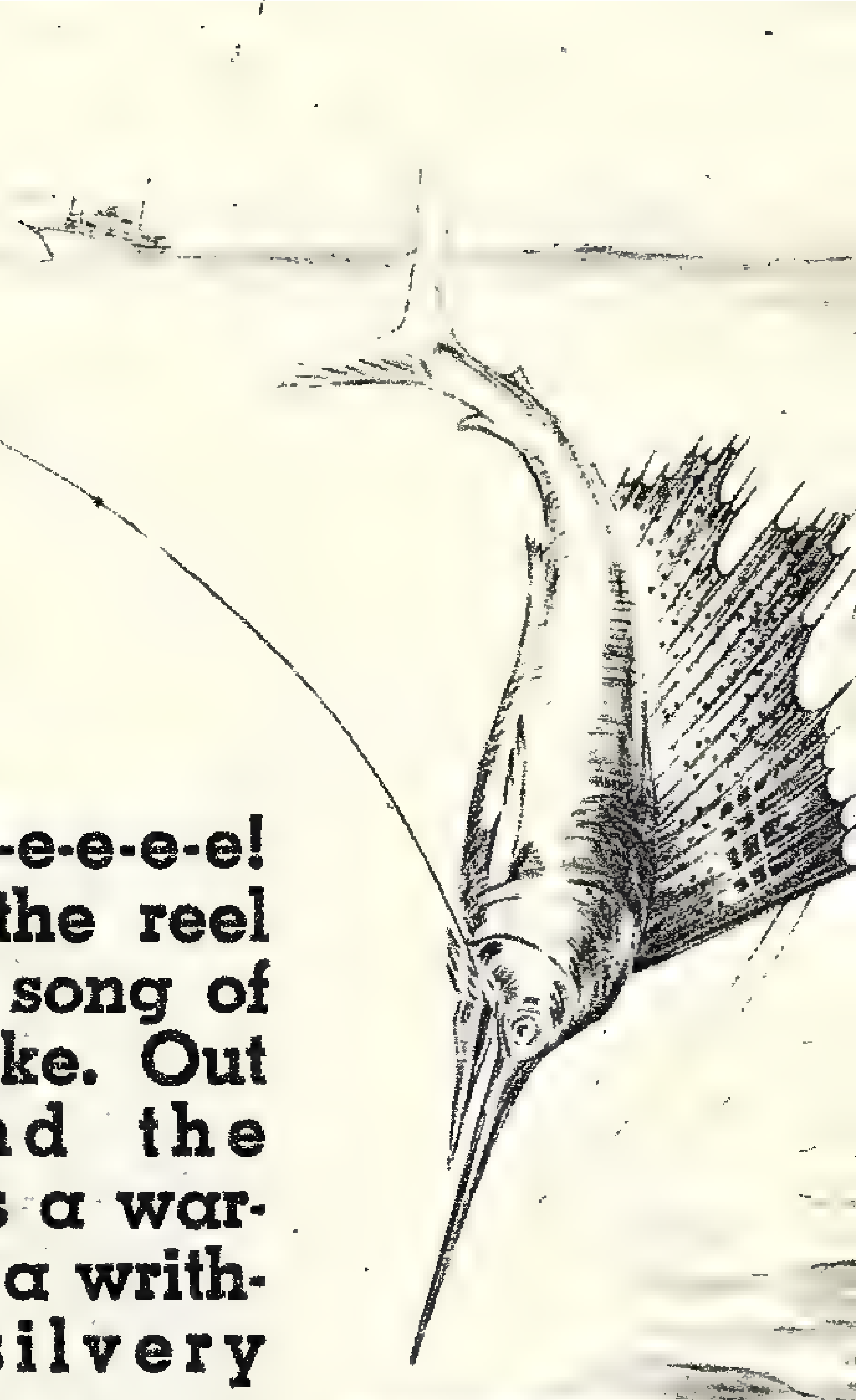
TACKLE For Salt

UNLESS you are familiar with sea fishing the selection of the proper tackle is open to conjecture. There are so many sea fish, all of which fall into many and various divisions such as large, medium and small, some mad tearing and others just a little bit better than very active. All of these species have to be taken into consideration when selecting sea-fishing tackle.

Needless to state the tackle to be used for sea fishing must be picked according to the size of the fish one is after. Obviously the very large fish, such as the marlin swordfish, the sailfish, the tarpon and the tuna (all racy fish of tackle-testing proportions and activity) demands the stoutest and most enduring tackle. For such fish a double enamel tip of 60 inches and a weight of approximately 14 to 16 ounces is a suggestion. The butt length will be 20 inches, or the rod, with butt in place, measuring 6 feet 8 inches over all. With a rod of the sort a 9-0 reel or heavier is a suggestion. A 36 to 38-thread cuttyhunk line is often used although lighter lines are selected by those practiced in the use of medium weight tackle.

Medium weight tackle is used in the taking

Circle—Hooking a tarpon is synonymous to roping a wild mustang. When the strike occurs, the great fish leaps high out of the sea in efforts to shake off the hook, then the fight is on. Below—A sextette of big ones soon to become swordfish fillets. In Southern California waters, where these pictures were taken, monster, man-eating sharks often bite chunks from the fish before it can be hauled aboard the boat.



Water FISHING

by
Robert Page Lincoln

of such fish as the barracuda, the amberjack, the great kingfish, California yellowtail, crevalle and others. *The rods for this* purpose should range from 10 to 14 ounces, with a 6-0 reel to keep it company. A 24 to 30-thread cuttyhunk line is a practical suggestion. A double enamel rod is not needed for this department, the single enamel rod being suitable and not too light. A tip in this class weighing 9 ounces has a length of 60 inches.

A lighter rod, one ranging 7 to 10 ounces in weight will take a 4-0 reel, with a cuttyhunk linen line of from 15 to 21 threads. A rod of the sort will handle with ease all fish less in weight than the species listed in the second class. Incidentally, let it be mentioned that in this third class of sea fish, in which will be found the mangrove snappers, the Spanish mackerel, the bluefish, the sea trout, the channel bass, the smaller croakers, the robalo, the sheepshead, and others, the common, everyday bait rod and black bass fishing tackle such as is used in inland fishing is now much in vogue. In fact, there is an ever-increasing disposition on the part of anglers to invade even the ranks of the class

Whe-e-e-e-e-e! sings the reel in the song of the strike. Out behind the boat is a warrior in a writhing, silvery dance—a cyclone on a leash!

Sometimes a young hammerhead shark gobbles up the bait, as shown above. To cut the hook from the mouth of this detestable fish often results in a skinned arm or hand, for sharks have sandpaper skin. Below—A proud man poses with a 200-pound marlin swordfish which he caught in the Gulf of Mexico.

two fish with this comparatively light tackle. The bait rod of the bass type is now something of an institution on all coasts, Pacific and Atlantic and in the Gulf of Mexico. In class three will be found fish ranging from five to fifteen pounds in weight.

Mention of the everyday black bass bait casting rods as used in sea fishing, in the inlets, bays, and in the river mouths along the coasts, should bring out the fact that while the typical bamboo rods may be used, these should be in the double enamel class which gives them considerable strength. The seamless tubular steel rods are especially suitable to salt water fishing in that no salt moisture can get inside of the same to rust the interior and so making for a broken rod.

A regulation bait casting reel holding 100 yards of hard braided silk line is used in this salt water fishing, ranging 18-pound to 25-pound test. Owing to the fact that the saline influence of the sea has its effect on the silk the result is that, regardless of its merits, it will deteriorate. The usual method is to wash the line in fresh water after coming in from a trip on the briny deep.

A few years ago there were but few of our typical black bass plug lures being used in salt water fishing. Now they are sold by the thousands in every salt water fishing location, especially around the Florida coasts and in the Gulf of Mexico from Naples, Florida to Brownsville, Texas. While various underwater lures have their champions in salt water fishing as it is practiced with our inland, fresh water bait casting rods and regulation black bass tackle, still the type of lure that is mostly in demand are the various surface lures, the variety that can be "popped" on the surface. A lure of the sort floats when not in action. By reason of a raised collar, a scoop in the wood at the head, double-jointed effect, or some other means which will agitate the water, it is used to wonderful effect. The lure is cast and then, as it is reeled in, it is

[*Continued on page* 120]

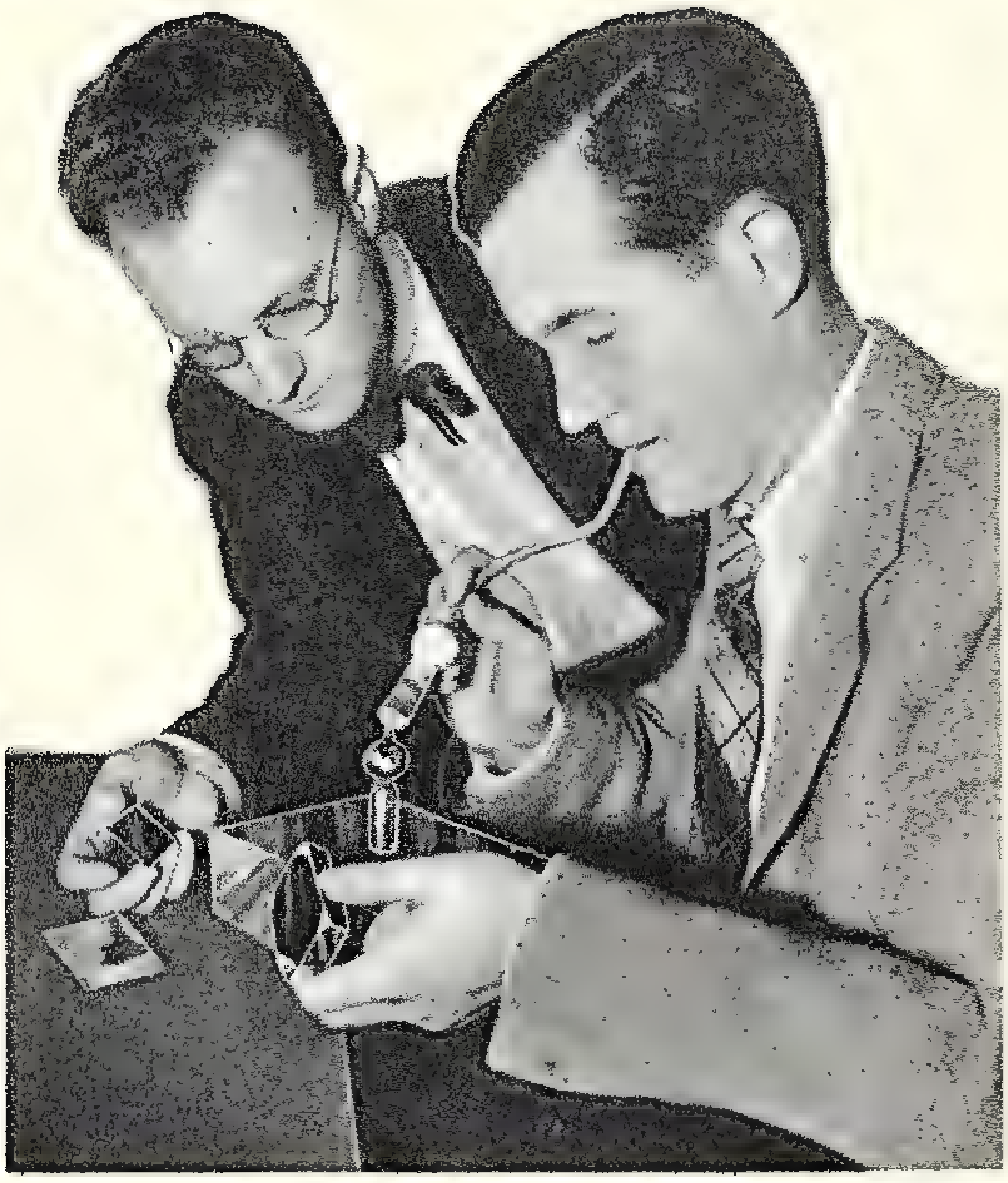
In a single day, between dawn and dusk, this trio sailed back to camp with 4 sailfish and 4 marlin, all caught in deep water off San Pedro Island, California.

One of the most vicious and dangerous sea fighters is the Manta Reya, often called the blanket fish, which inhabits the waters off the Coast of Mexico. The monster shown below measures 24 feet across and is 8 feet thick. He is caught from a large boat, but is often accidentally hooked by dory fishermen. But wise to the ways of this vicious fish, they cut the line and row out of the vicinity. These fish swamp small boats.

IODINE VAPOR DETECTS FINGERPRINTS

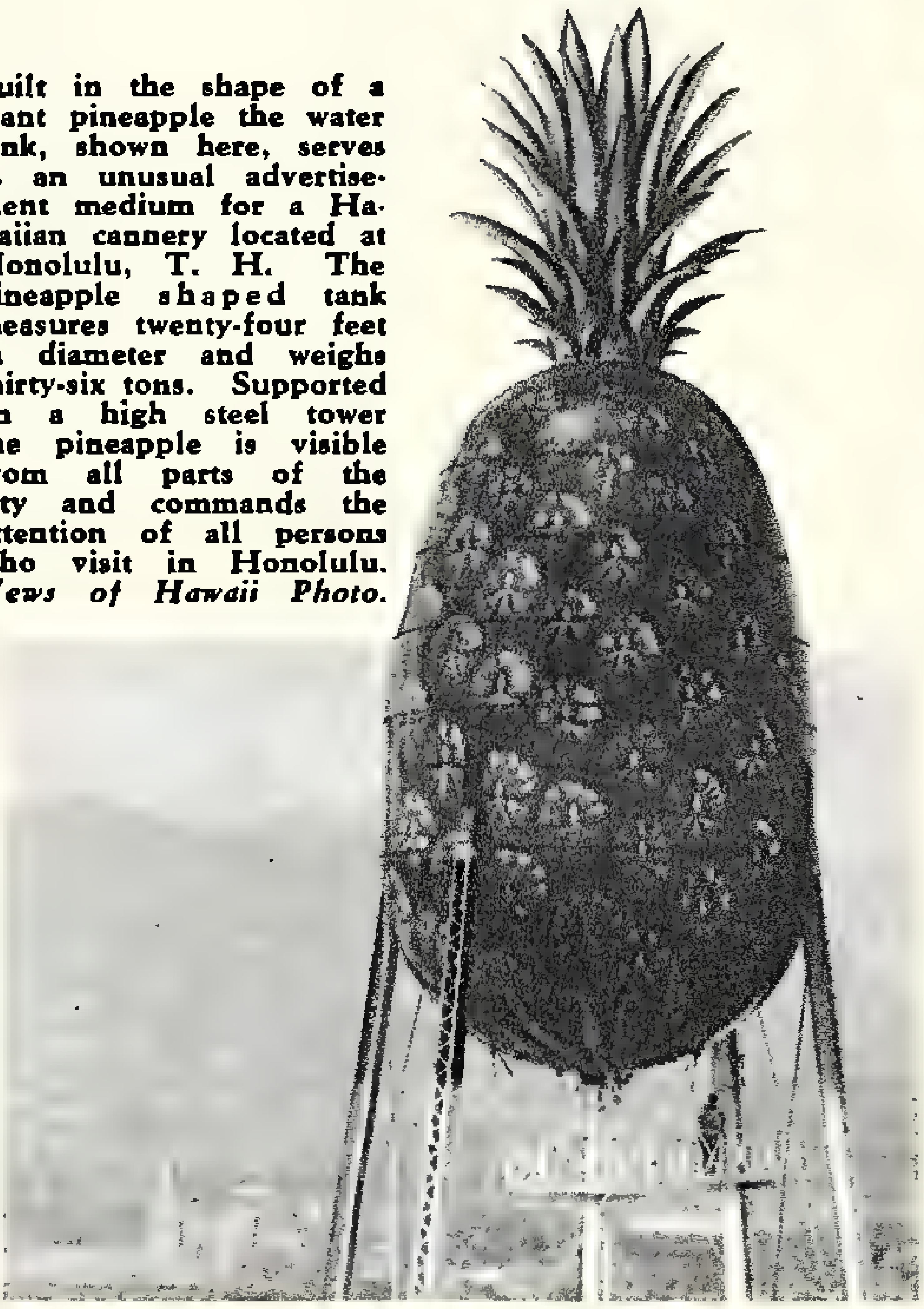
SCIENCE again has played an important part in the war on crime with the invention of the iodine vapor fingerprint detector by two Pasadena, California, men. Working with the assistance of Lieut. R. S. Sears, of the Pasadena Police Department, Dr. John McMorris, a chemist, has perfected a device which reveals fingerprints simply by blowing on them.

The instrument consists of a glass thistle tube containing calcium chloride. When the breath is blown through the rubber hose it is heated by the calcium chloride which then absorbs the iodine fumes in another portion of the tube and projects them on the fingerprint surface. The vapor detector has gained the attention of police officials everywhere.



When the breath is blown through this apparatus iodine fumes are given off and fingerprints immediately show up. Dr. John McMorris is shown demonstrating the device to an assistant.

Huge Pineapple Water Tank

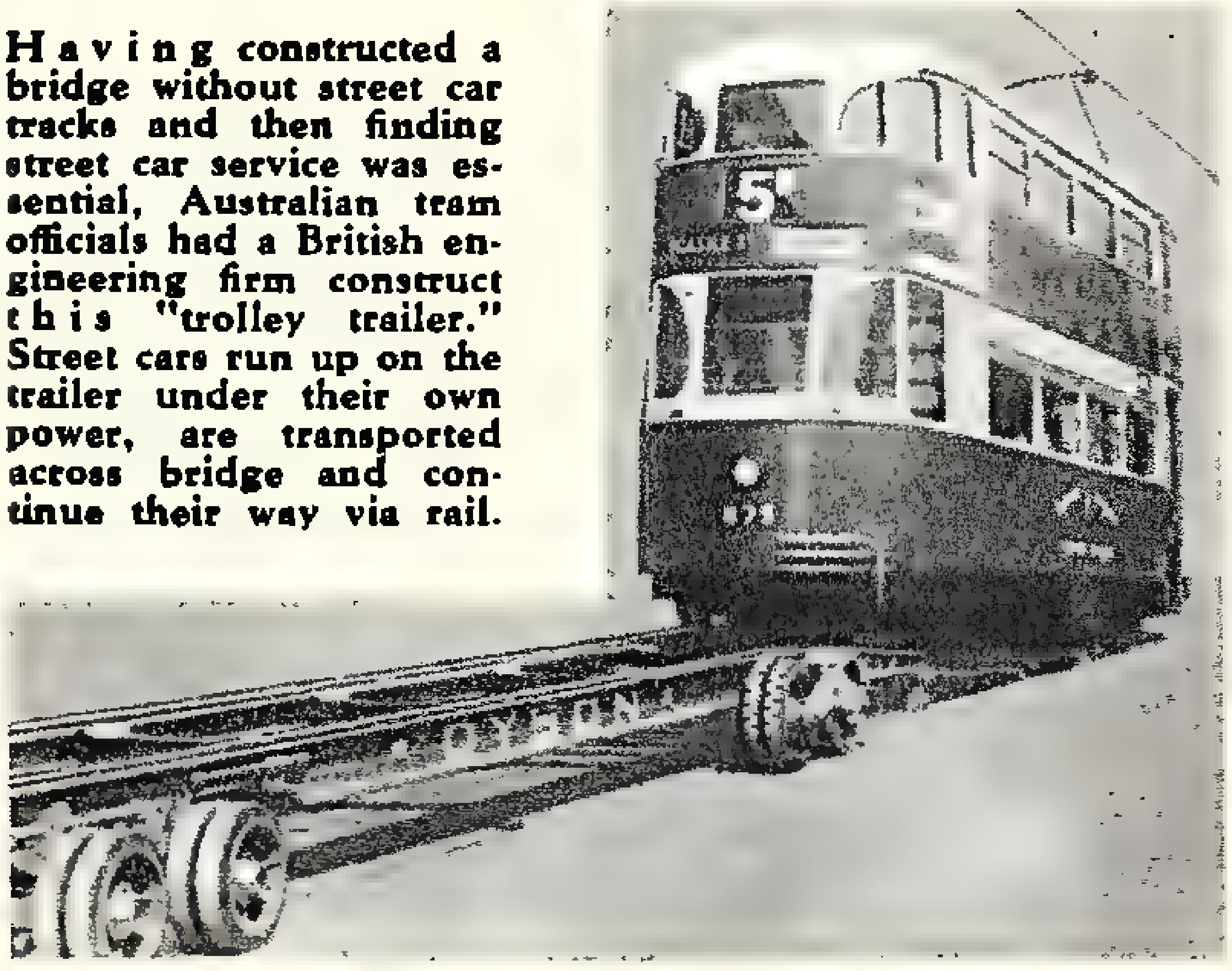


Built in the shape of a giant pineapple the water tank, shown here, serves as an unusual advertisement medium for a Hawaiian cannery located at Honolulu, T. H. The pineapple shaped tank measures twenty-four feet in diameter and weighs thirty-six tons. Supported on a high steel tower the pineapple is visible from all parts of the city and commands the attention of all persons who visit in Honolulu. *News of Hawaii Photo.*

FASHIONED after a huge pineapple, a water tank on the roof of a large Hawaiian cannery is the cause of much comment by visitors to Honolulu. Visible from all parts of the city the pineapple looks as natural as the actual fruit. Supported on a tall steel tower the tank measures twenty-four feet in diameter and sixty feet high.

Cars Use Trackless Bridge

AFTER designing and building of the famous harbor bridge at Sidney, Australia, had been completed engineers realized that they had overlooked the installation of street car rails. As a result one of the city's important lines was severed and to lay tracks over the completed bridge would have been next to the impossible. An English engineering firm in Liverpool was called on to solve the problem and as a result service has been restored through the use of motorized "trolley trailers."

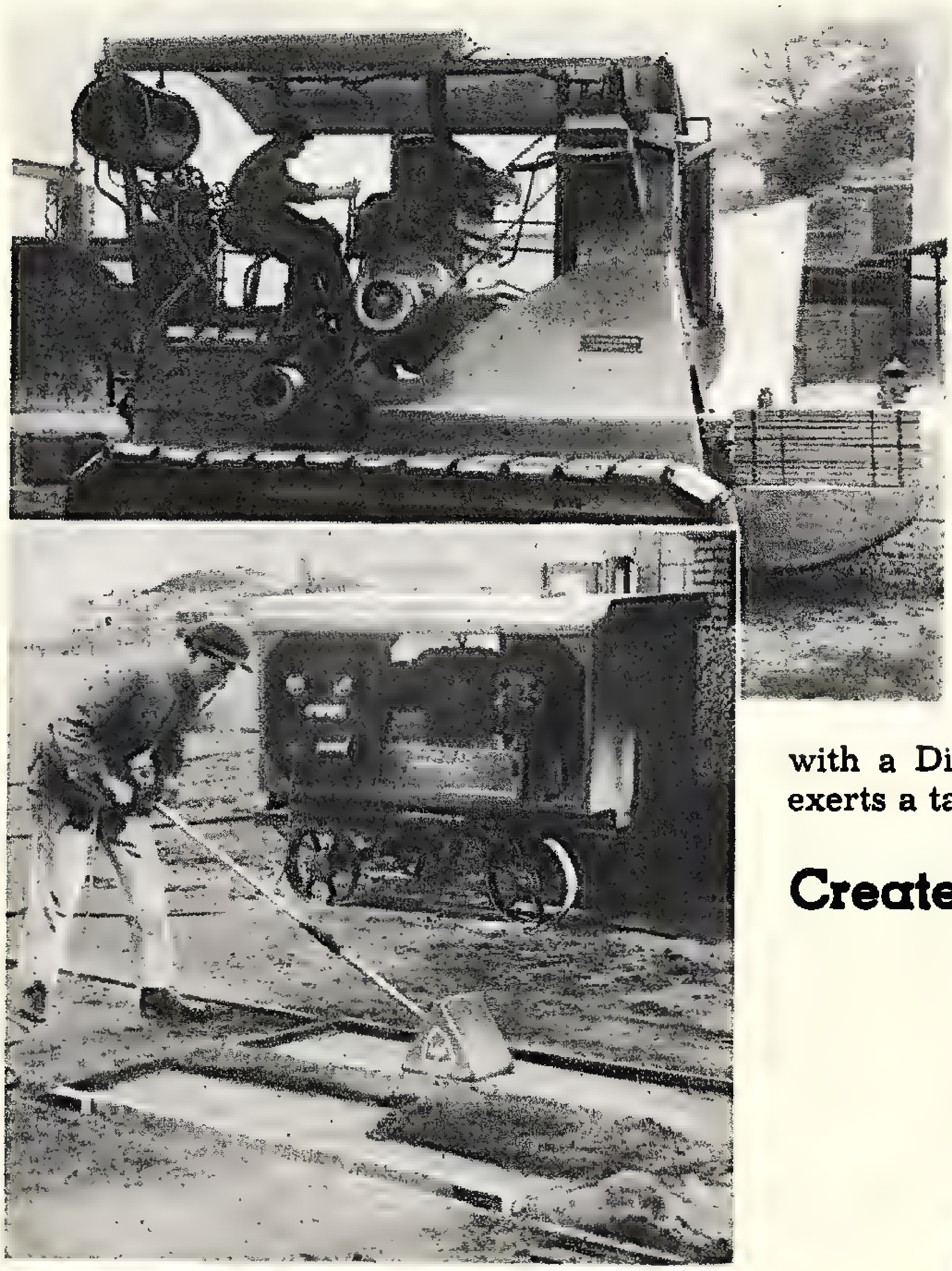


Having constructed a bridge without street car tracks and then finding street car service was essential, Australian tram officials had a British engineering firm construct this "trolley trailer." Street cars run up on the trailer under their own power, are transported across bridge and continue their way via rail.

Vibrator-Tamping Machines Develop Great Power

DESIGNED to produce a maximum of power with a minimum of weight, two new types of vibrator-tamping machines have been developed in Germany. They are used for tamping down newly made asphalt or concrete roads and other similar construction work.

The smaller of the two new machines is powered with a small electric motor and is capable of exerting a tamping force of 600 pounds. An electric cable running through the handle of the machine connects the motor with a portable power unit. The larger machine, mounted on a tractor, is powered with a Diesel motor of 100-horsepower. It exerts a tamping force of over 60,000 pounds.

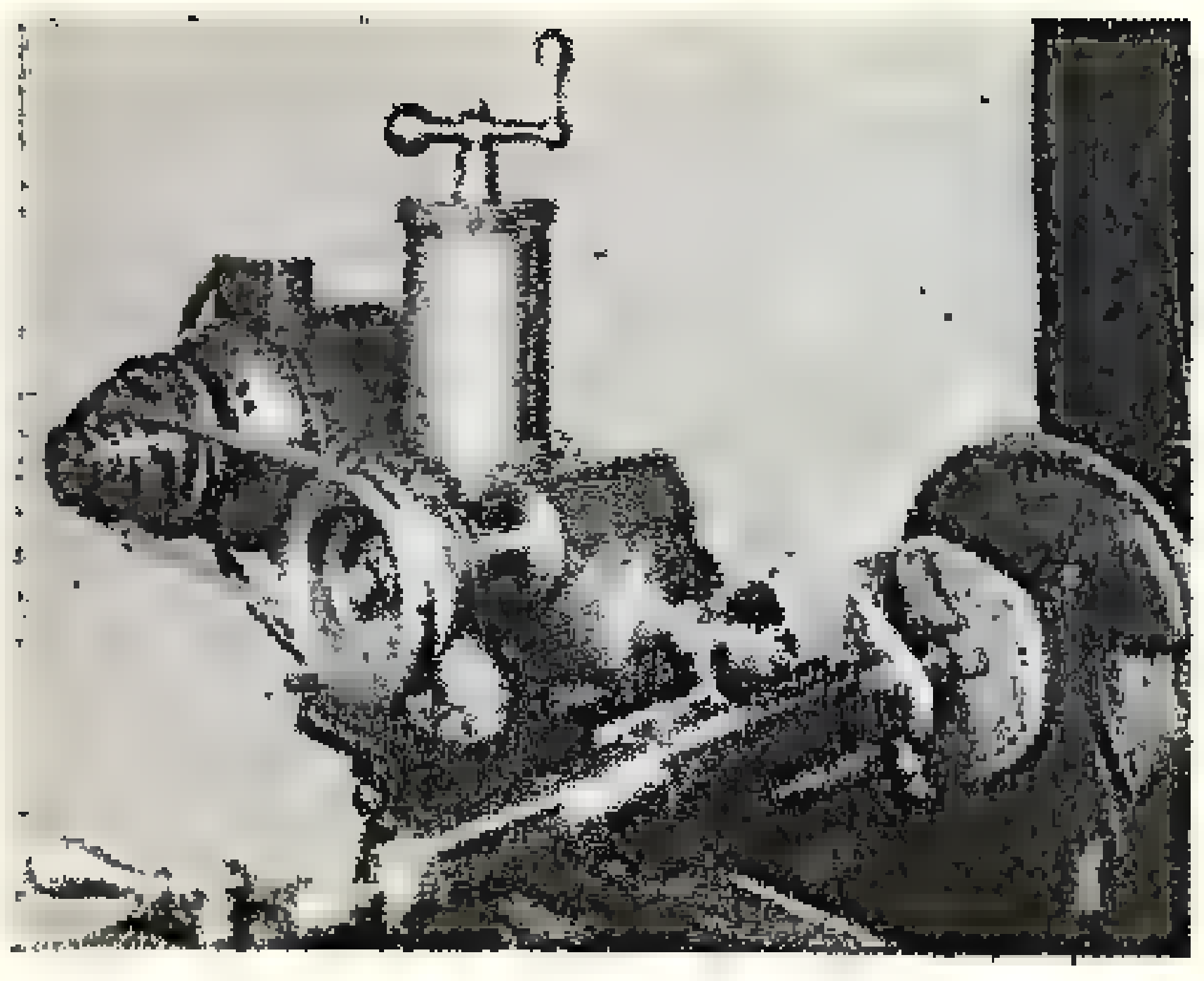


Top—Equipped with a 100-horsepower Diesel engine, this machine tamps down new asphalt and concrete roads with a tamping pressure of 60,000 pounds. Bottom—This hand operated tamper exerts 600 pounds pressure.

Converter Aids Lathe Work

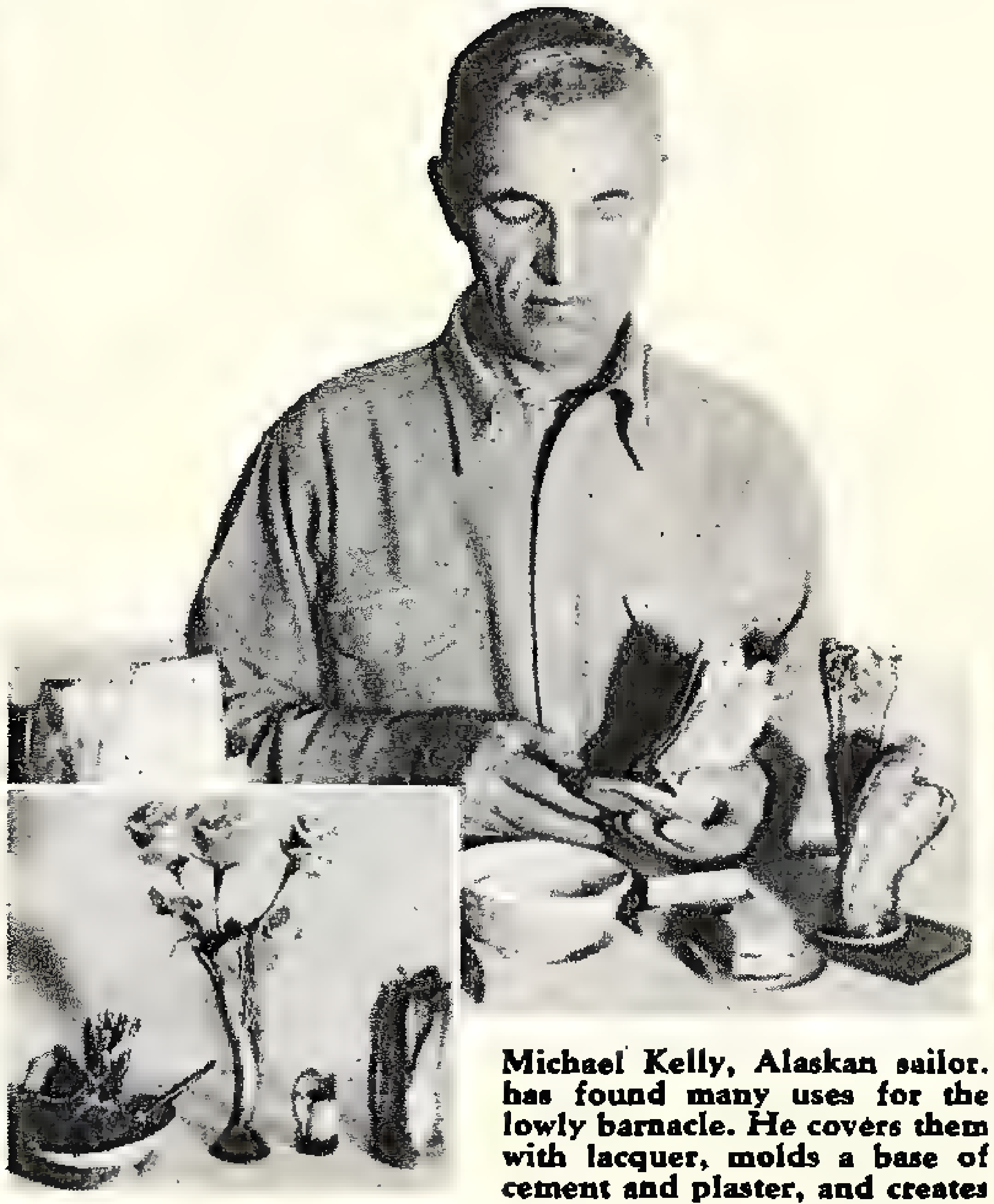
A MASTER lathe converter device that makes it possible, when used in conjunction with an engine lathe, to do practically every conceivable operation of milling, grinding, and broaching, has been invented by a North Kansas City, Mo., manufacturer.

A feature of the new device is that it is not necessary to dismantle the lathe in order to attach it.



This master lathe converter, when used on an engine lathe, enables the operator to use the lathe as a milling, grinding, or broaching machine. It is easily attached.

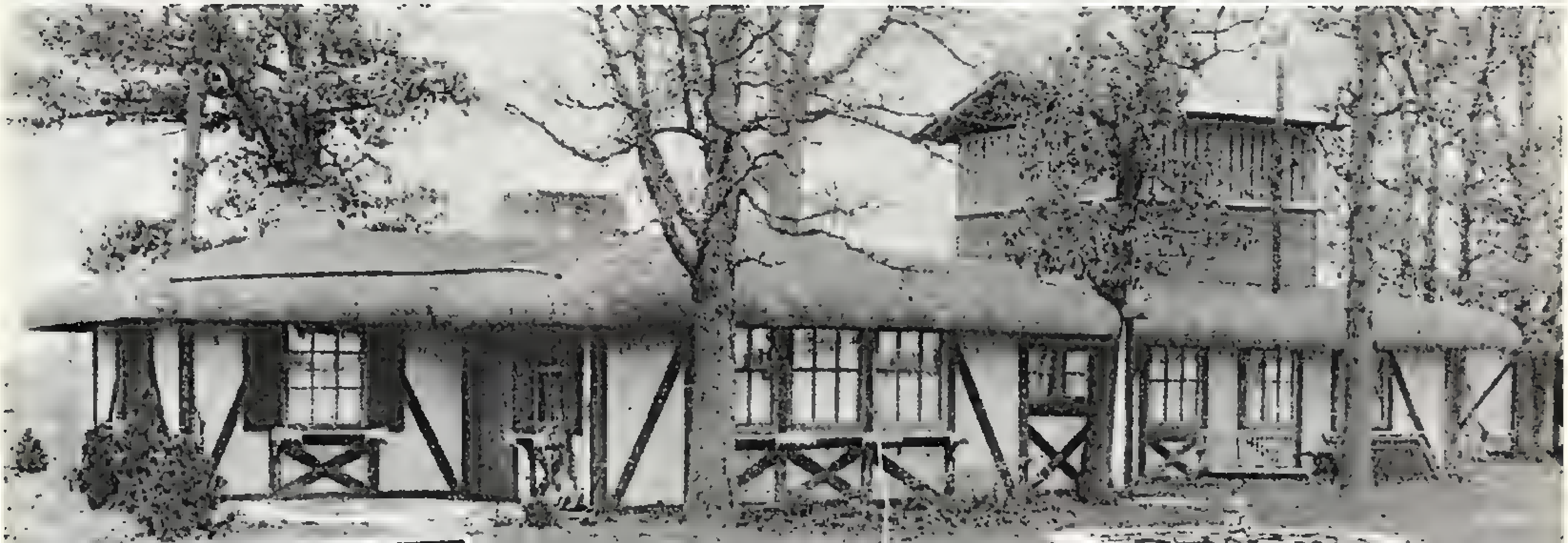
Creates Barnacle Novelties



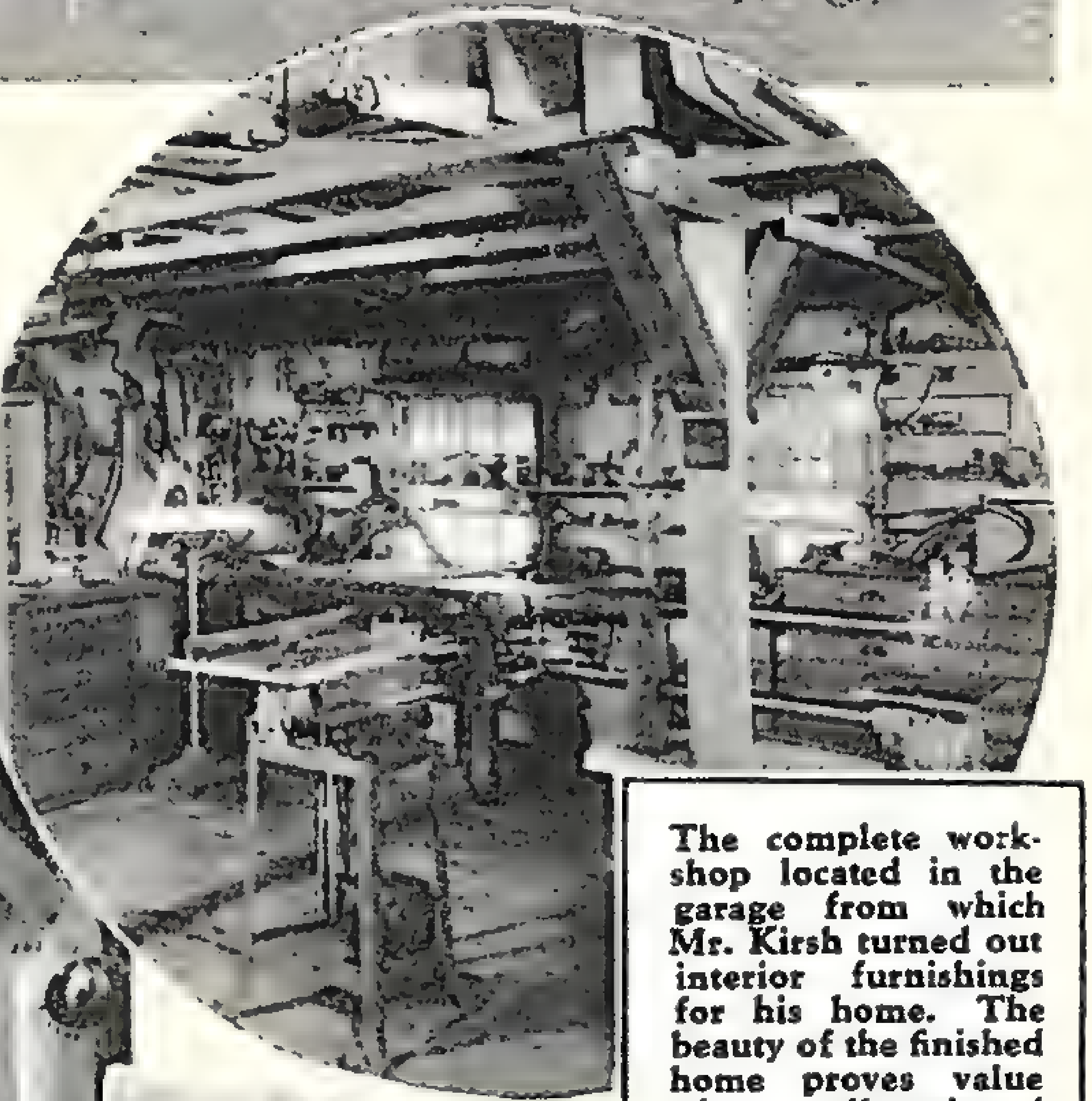
Michael Kelly, Alaskan sailor, has found many uses for the lowly barnacle. He covers them with lacquer, molds a base of cement and plaster, and creates flower vases, ash trays, etc.

FLOWER vases, ash trays, match holders, and many other novel objects have been created from barnacles by Michael Kelly, an Alaskan sailor. The barnacles, ranging in size from 1 to 15 inches, are treated with lacquer to give them a finish. Quick setting cement makes a base for the finished objects.

WORKSHOP FAN BUILDS OWN HOME



Above—This charming stucco-covered home of Swedish design was constructed by one man at Fox Lake, Wisconsin. A pent house tops the combined workshop and garage. Left—Hugh I. Kirsh, vice-president of the Western Malleable Co., built the home in his spare time.



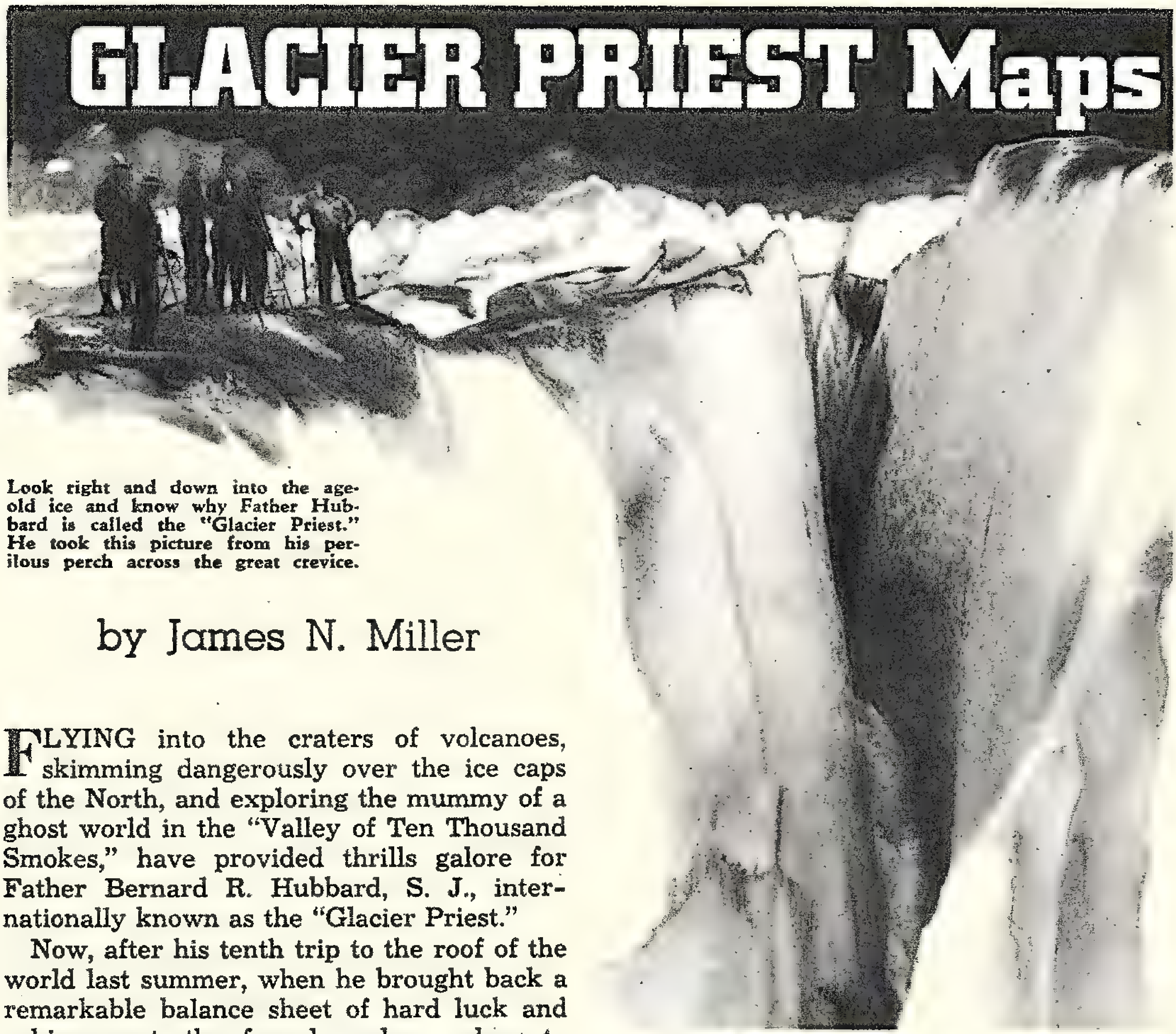
The complete workshop located in the garage from which Mr. Kirsh turned out interior furnishings for his home. The beauty of the finished home proves value of a well-equipped home workshop for the tool-handy man.

Handmade twin poster beds with beaded decorations are a feature of Mr. Kirsh's home. Knotty pine walls add beauty.

HUGH I. KIRSH, of Fox Lake, Wisconsin, built and furnished his own home. Of Swedish design, the home is distinguished by attractive hammered iron work and novel woodworking furnishings. A drooping shingled roof and a gray stone chimney serve to give the home an aspect that fits in well with the surrounding landscaped setting.

The dining alcove of Mr. Kirsh's unique home. Scrolled window frames, open shelves and handtiled decorations beneath the leaded windows create an effect of simple beauty.

GLACIER PRIEST Maps



Look right and down into the age-old ice and know why Father Hubbard is called the "Glacier Priest." He took this picture from his perilous perch across the great crevice.

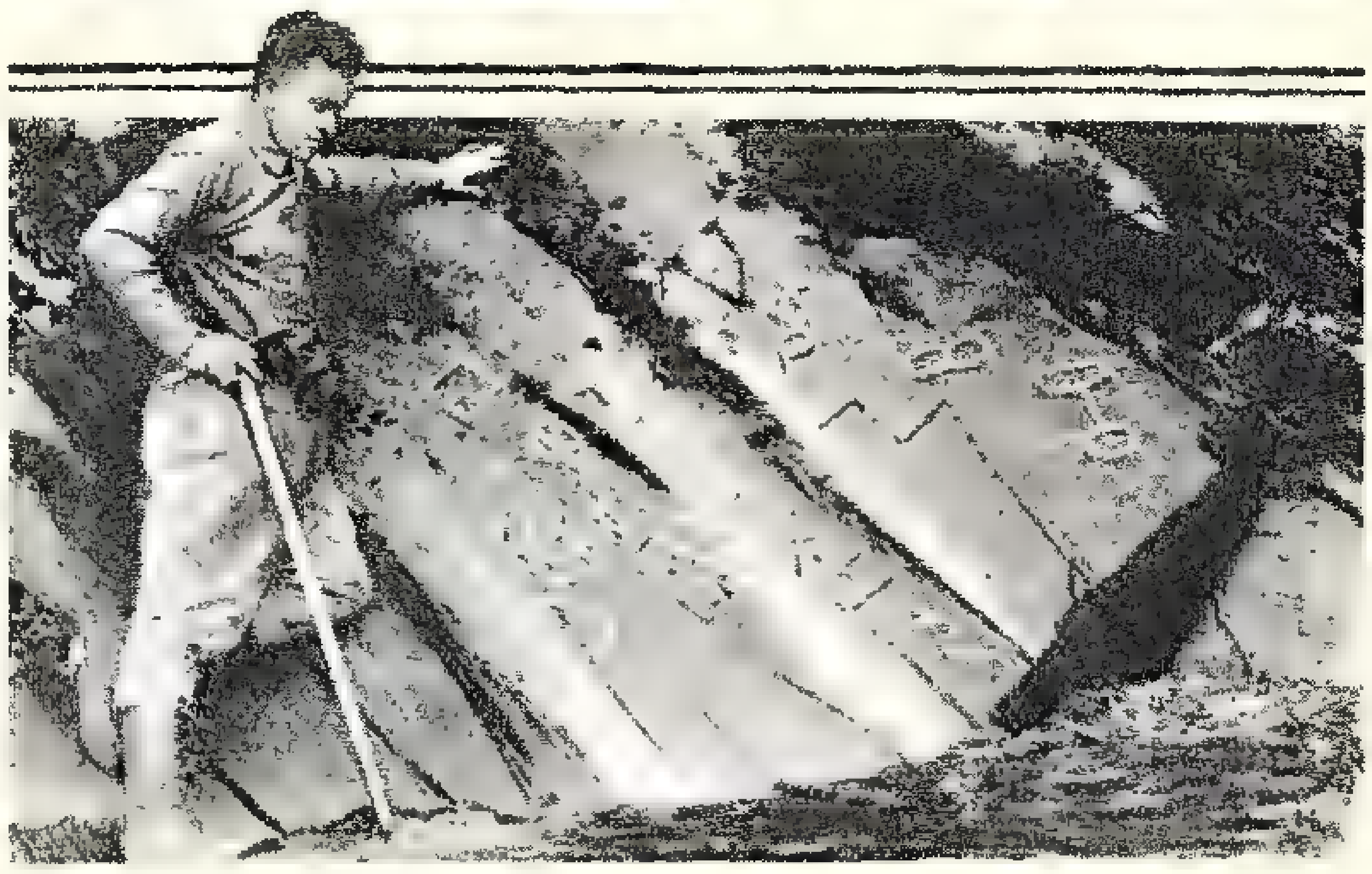
by James N. Miller

FLYING into the craters of volcanoes, skimming dangerously over the ice caps of the North, and exploring the mummy of a ghost world in the "Valley of Ten Thousand Smokes," have provided thrills galore for Father Bernard R. Hubbard, S. J., internationally known as the "Glacier Priest."

Now, after his tenth trip to the roof of the world last summer, when he brought back a remarkable balance sheet of hard luck and achievement, the famed explorer plans to turn from the study of geology—the science of rocks—to the study of primitive human beings.

For, while pondering the mysteries of the birth of storms that influence the four seasons of the year in the United States for better or for worse, Father Hubbard believes he has also fathomed the origin of man in America, who came to this continent on a newly discovered ancient road from Asia.

Father Hubbard believes that his last trip, the tenth in a successive series, was the most important of all. He found that the Taku ice-cap, near Juneau, one of the southernmost formations of its kind, is receding and exposing a fossil glacier of the last Ice Age. Nearby, he said, the Taku glacier was half aground and will soon cease breaking off icebergs, and Twin glacier has receded a mile and is wholly aground. This means the tremendous flow of icebergs that consitutes an ever-present menace to shipping hundreds of miles to the south, soon will be a hazard of the past.



Does this rock writing mark the road by which ancient man first came into America from Asia? Father Hubbard (above) believes so, claiming many came in over this chain of Aleutian Islands, although the main route was by the Bering Sea.

Viewing the immense Taku ice-cap last summer for the first time in ten years, the Glacier Priest reported:

"The vast ice mass is shrinking, which proves that the earth is still in a recessional ice age. On Taku ice-cap many new mountains, called Nuntakas, as well as long, rocky ridges have appeared where I saw only

ROOF of the WORLD

Soaring over craters, jumping bottomless pits edged with rotten ice, frozen by gales, feet frying in volcanic heat—these are experiences of Father B. Hubbard.

Magook, Father Hubbard and Wolfe—the three pals who fought the dangers of six Alaskan expeditions together. And last summer, when a mother huskie gave birth to seven woolly pups, Magook and Wolfe toted the babies in addition to their 50 lb. packs.

Off Bogsolof, Father Hubbard attempted to make a 4-ton sea lion into a movie actor, but was rebuked with angry barks and a lumbering chase that threatened to crush the nearby cameras and scientific apparatus. A full-grown sea lion is no man's friend.

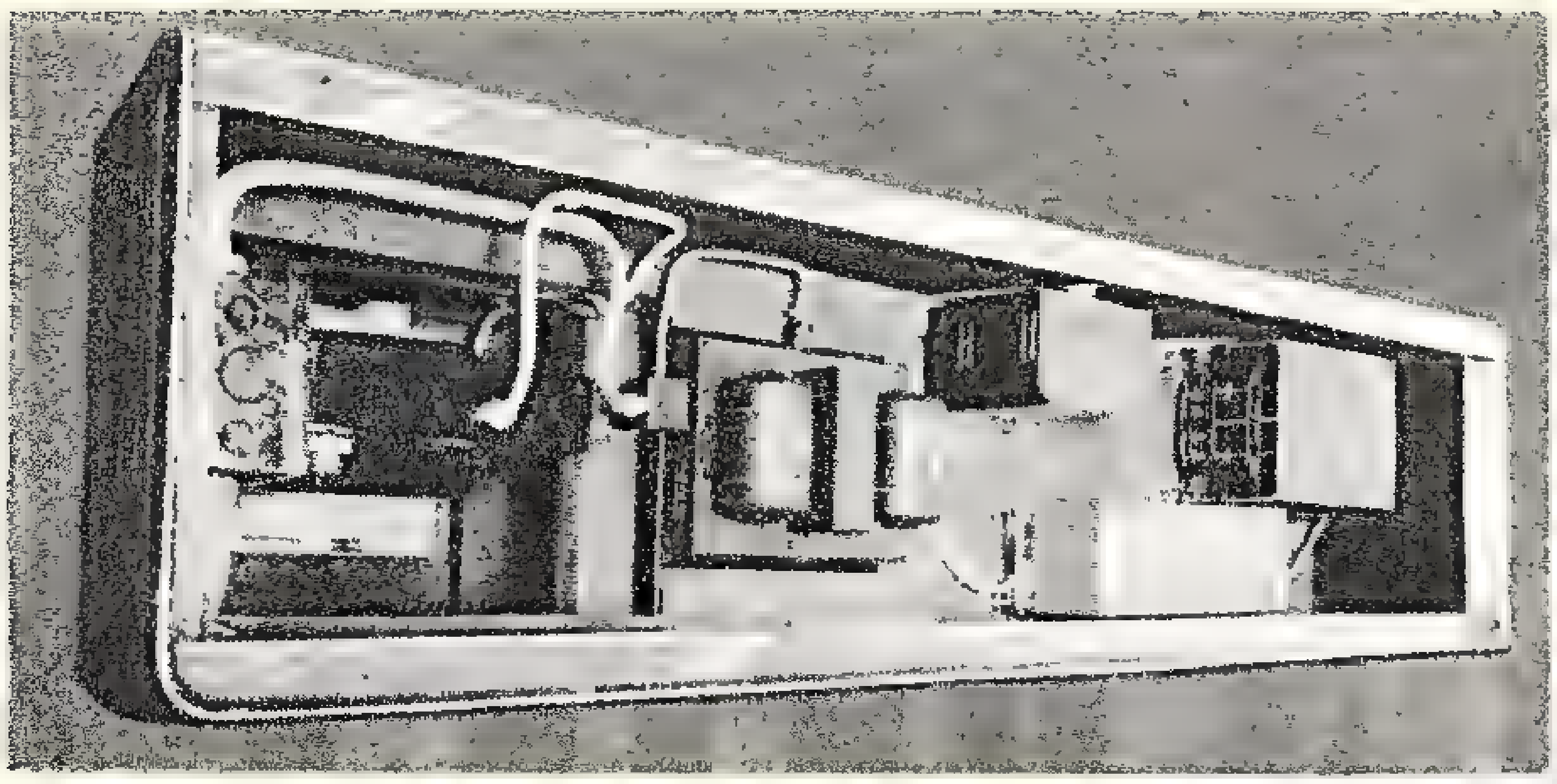
crevassed ice ten years ago, Taku glacier and the lobes of Twin glacier have retreated. The Mendenhall glacier has been melting back and is exposing a fossil glacier underneath the present one. The hundreds of square miles of this ice-cap and its many glacier tongues are a new layer of ice hundreds of feet thick lying on top of a remnant of the last ice age, which is a fossil body of ice entirely different in crystal form. It appears here and there as the upper layer melts."

Father Hubbard and his party found landlocked icebergs in Twin glacier lake, the bottom of which is 600 feet below sea level. The icebergs float there the year round, and keep the water near freezing temperatures.

Nicholas Cavalierre, of New Haven, Conn., a member of the Hubbard party, took 50,000 feet of motion pictures of the Taku region. The year before, on the ninth expedition, the party also took 30,000 feet of film of action "shots" of glaciers of a spectacular type never before filmed—showing enormous mountains of ice tearing away from the glacier mother to strike the sea below with a terrific roar and splash. These "shots" were made on the final 60-mile lap of exploration of the entire 600 miles of the Alaskan Peninsula and adjacent islands, and were taken from a small steamer anchored alongside Hubbard glacier in Disenchantment bay, southeastern Alaska.

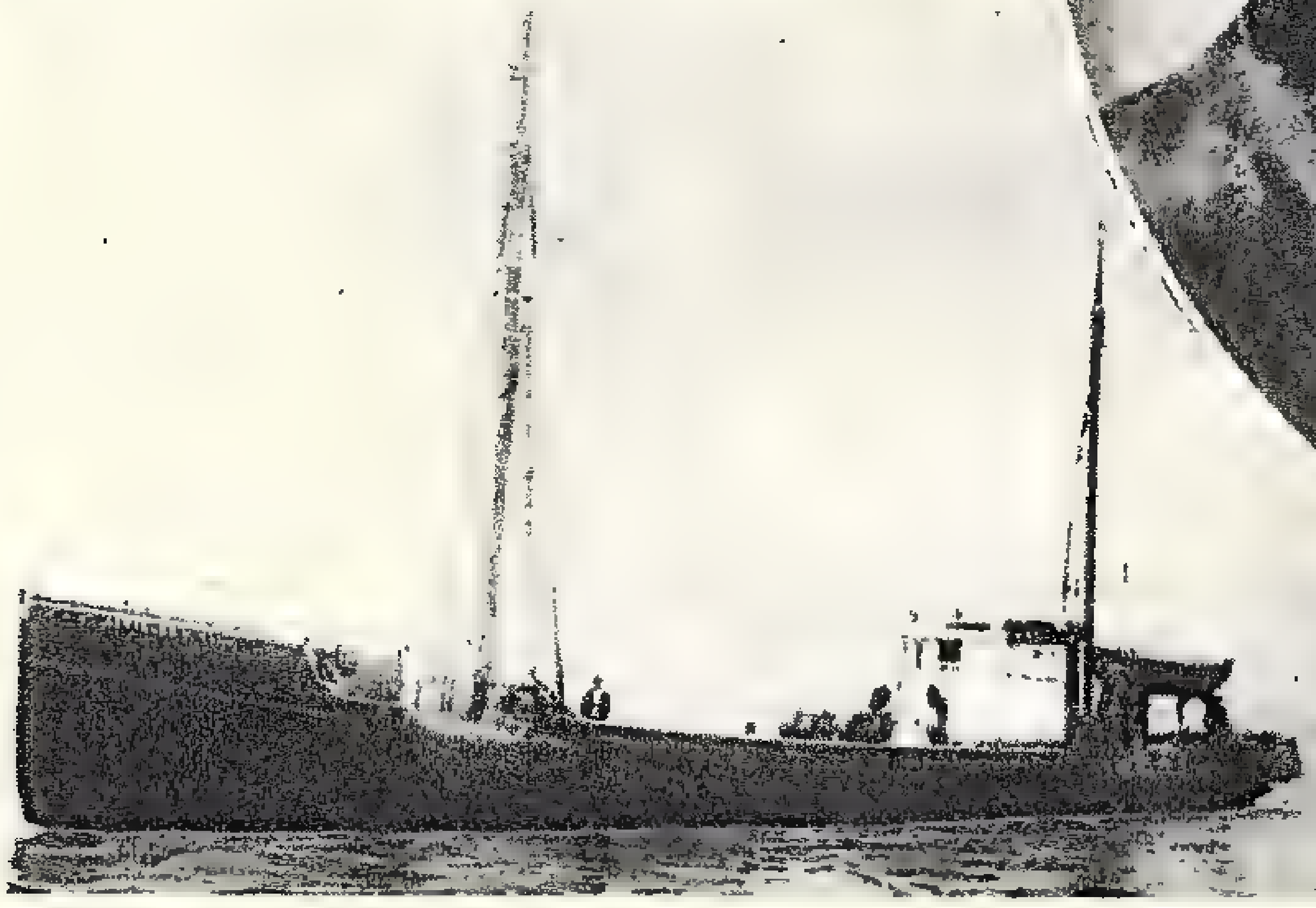
[*Continued on page* 128]

HARBOR TUGS TELEPHONE SHORE

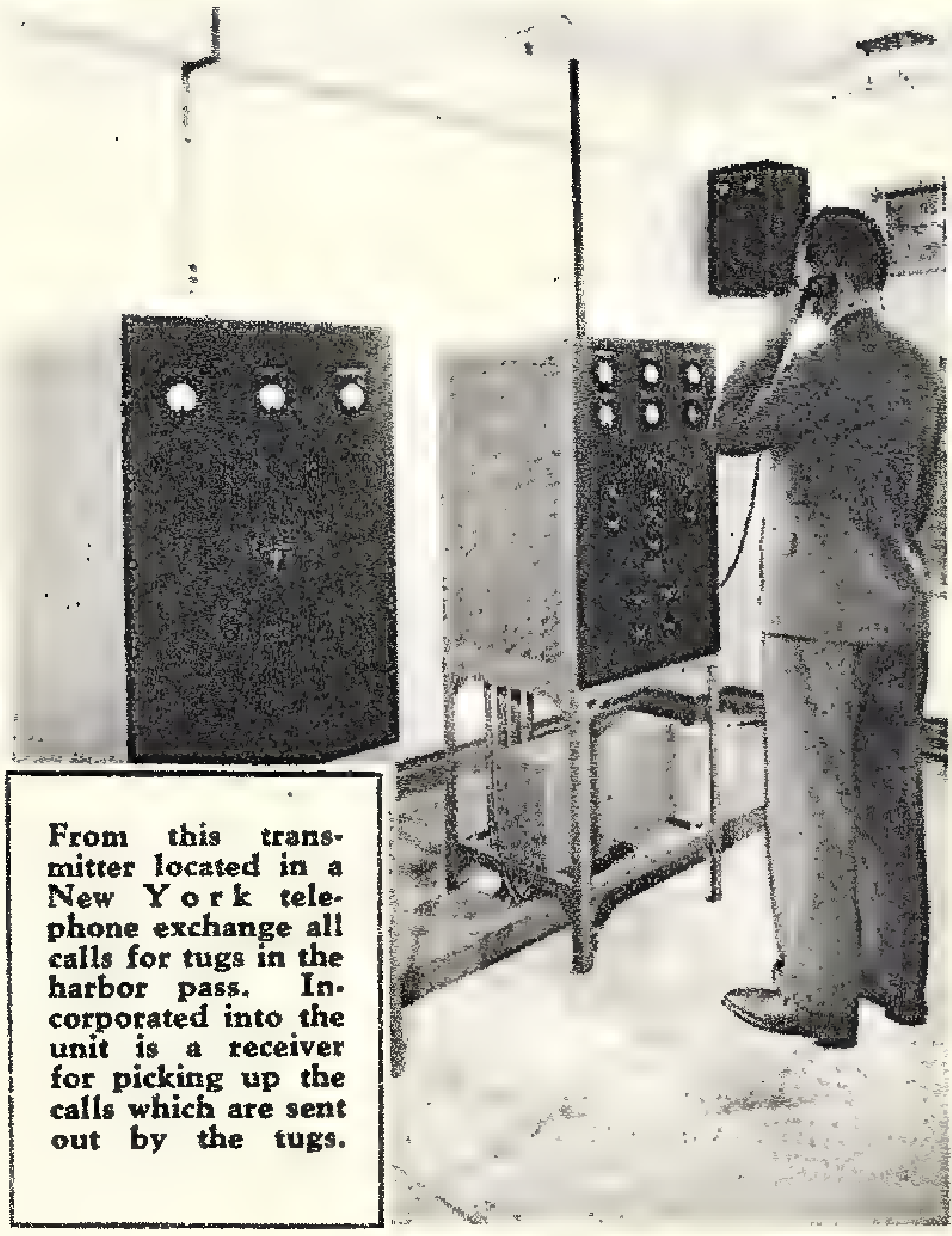


This harbor telephone system can be installed in a closet or under a bunk. It consists of transmitter, receiver and generator plant.

New England fishermen were the first to benefit from the radio-marine telephone. This fisherman is making a call on the older speaker monitor phone. Capt. Ole Whalen, shown below, calls his office on the new selective signaling equipment.



When the *Gertrude M. Fauci,* shown here, sprung a leak in the height of a wintry gale Capt. Patrick McHugh sent his men to the pumps and put through a rescue phone call.



From this transmitter located in a New York telephone exchange all calls for tugs in the harbor pass. Incorporated into the unit is a receiver for picking up the calls which are sent out by the tugs.

INTRODUCED a little more than a year ago as a means of keeping New England fishing vessels in contact with their ports the radio-marine telephone is now an important part of New York's harbor communications system. Until recently tug boats working in the harbor had to watch for wigwag signals from the shore or else put in to shore and call their office by telephone for further orders.

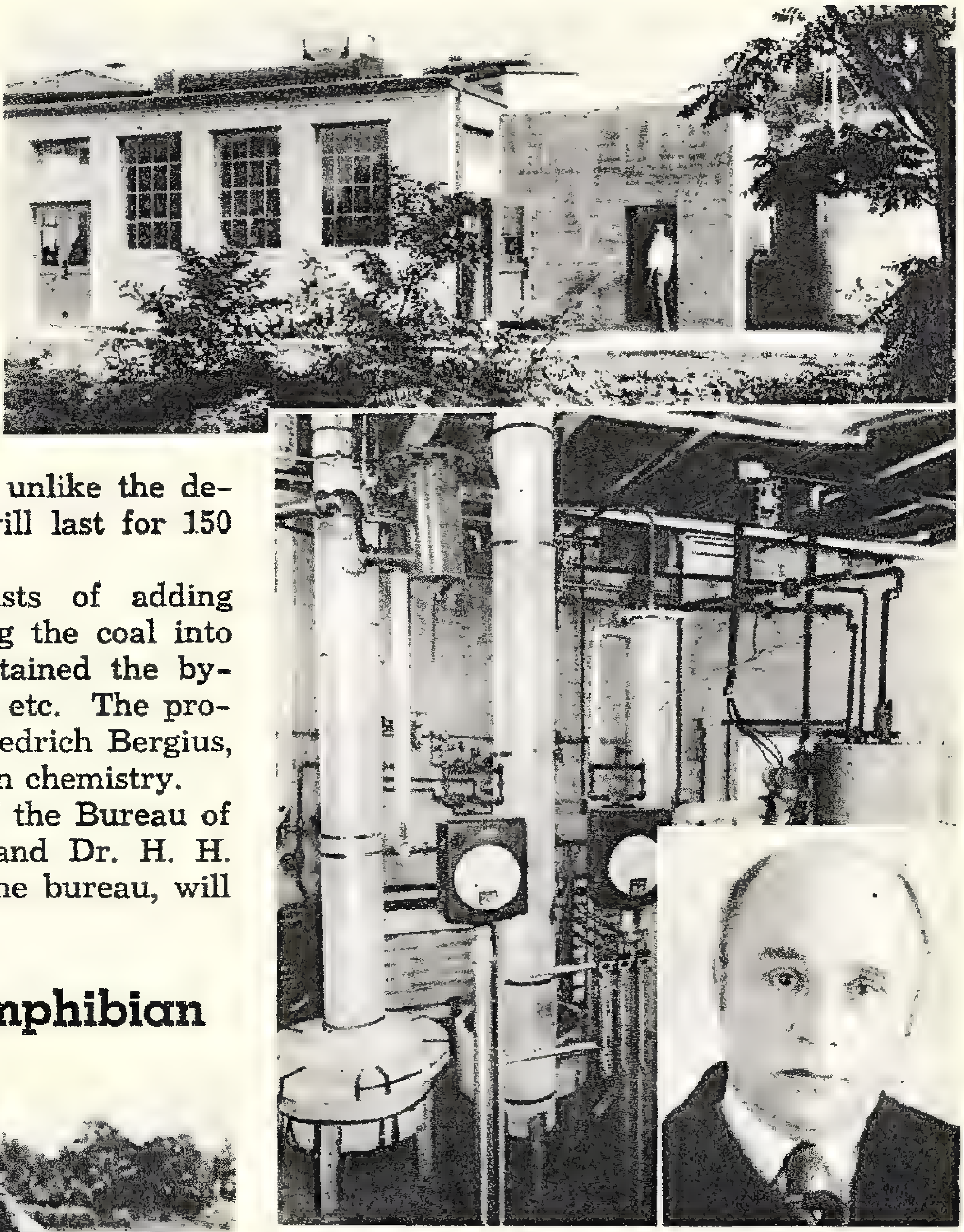
Due to its success in the New England area a radio-marine telephone system was decided upon for New York harbor traffic. A special exchange has been installed to handle all calls from craft in the nearby waters. A shortwave transmitter sends phone messages out to special receiving apparatus on the tugs.

Bureau Of Mines Opens First Hydrogenation Plant

LOOKING ahead to the day in the future when the oil supply of the nation may be depleted, the U. S. Bureau of Mines has opened the first hydrogenation plant in America at Pittsburgh, Pa. In the heart of the coal and oil district, the plant will be used to conduct experiments for making oil from coal. It is estimated that the coal supply of the U. S., unlike the decidedly limited oil supply, will last for 150 years or more.

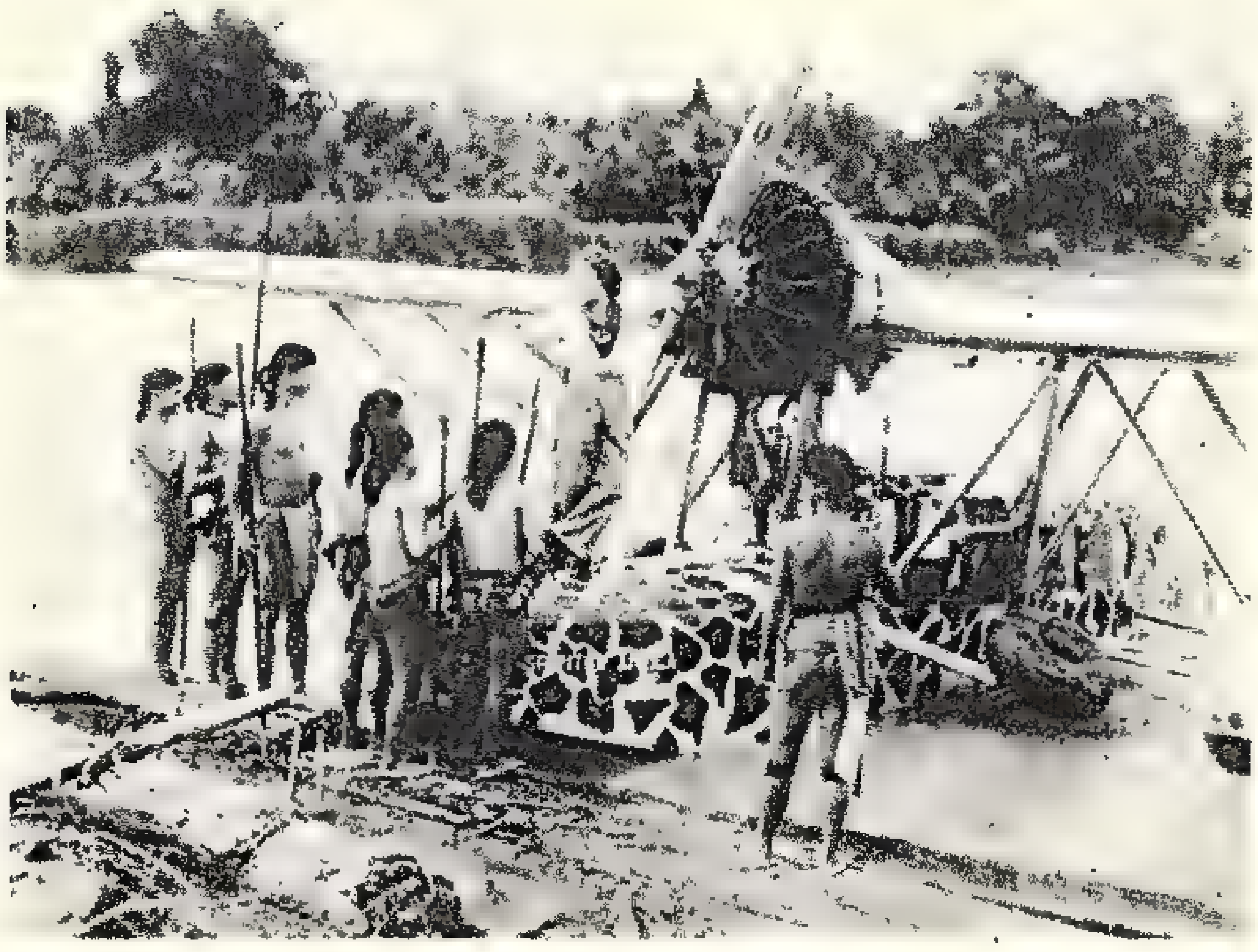
Coal hydrogenation consists of adding hydrogen to coal and turning the coal into petroleum from which is obtained the by-products—gasoline, kerosene, etc. The process was invented by Dr. Friedrich Bergius, German Nobel Prize winner in chemistry.

Dr. A. C. Fieldner, chief of the Bureau of Mines technologic division, and Dr. H. H. Storch, physical chemist of the bureau, will direct the plant's activities.



Top—First American hydrogenation plant erected at Pittsburgh, Pa., will enable U. S. Bureau of Mines to derive oil from coal. Lower Left—Plant apparatus. Lower Right—Dr. Friedrich Burgius, German chemist who invented the process.

Explorers Use Amphibian

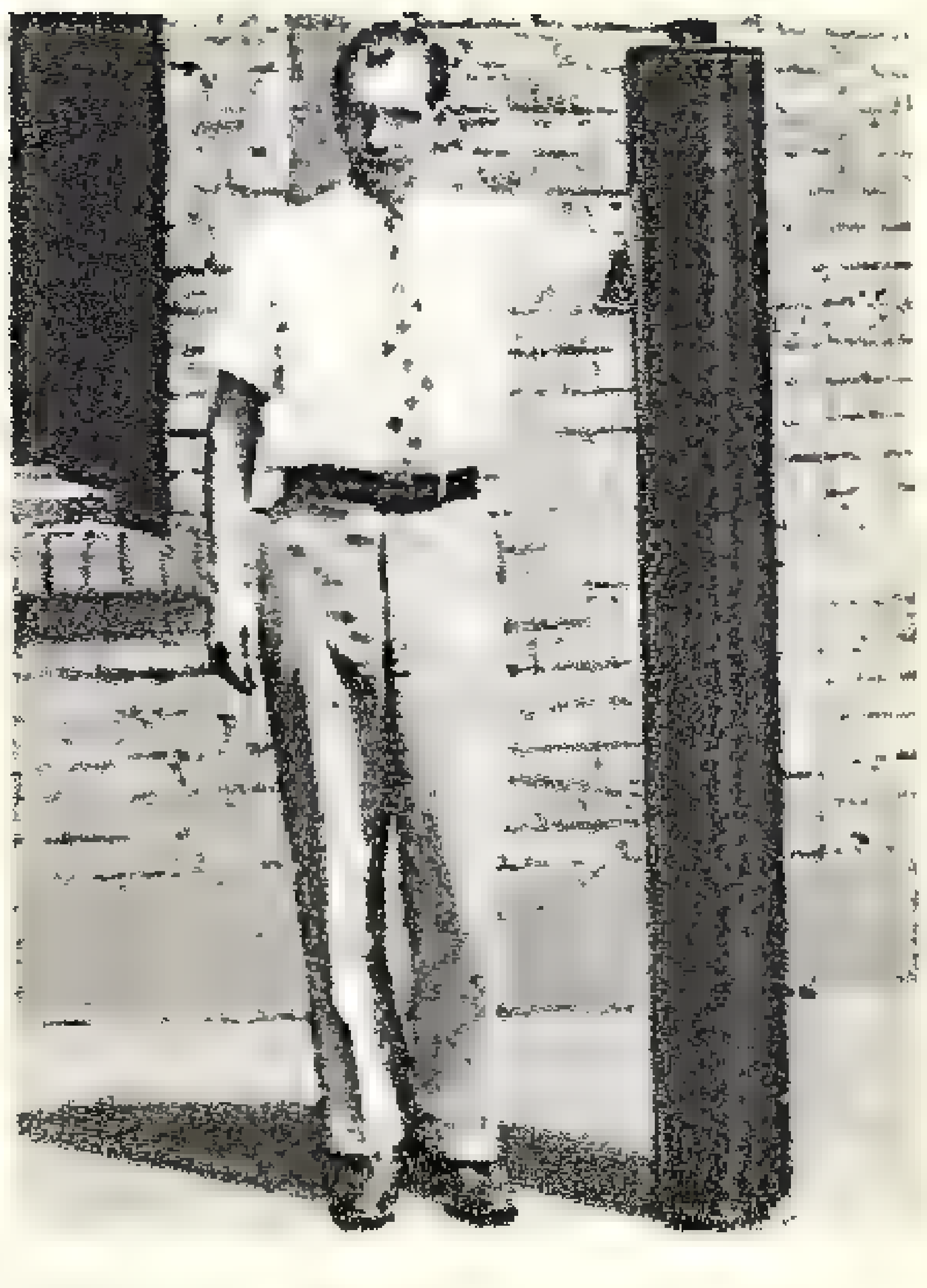


Standing on the bow of her amphibian plane, Mrs. Martin Johnson, famous explorer, invited these Borneo natives to fly. Awed at first, they soon enjoyed the sensation of flight.

AIDED by an amphibian plane based at their jungle camp on the Kinabatangan River in Borneo, Mr. and Mrs. Martin Johnson, noted explorers, are making sound pictures of wild life for the American Museum of Natural History. The plane, used by the Johnsons on their African expedition, too, is named "The Spirit of Africa and Borneo."

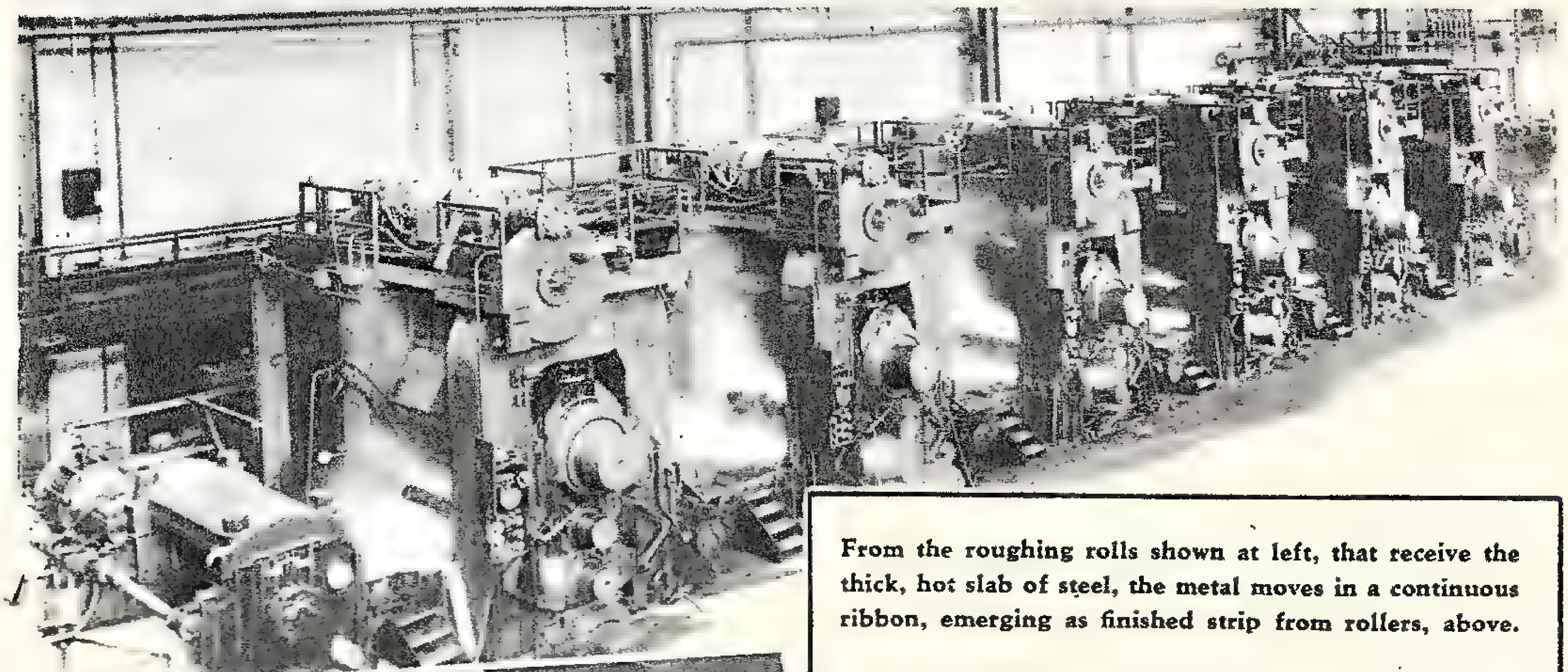
Dry Battery Provides Power

STANDING 6 feet high, the largest dry battery in the world is installed in a flashing inland waterway beacon at St. Louis, Mo. Manufactured by the Ray-Vac Electric Co., Madison, Wis., its 70 cells will provide 6½-volt power for one year.

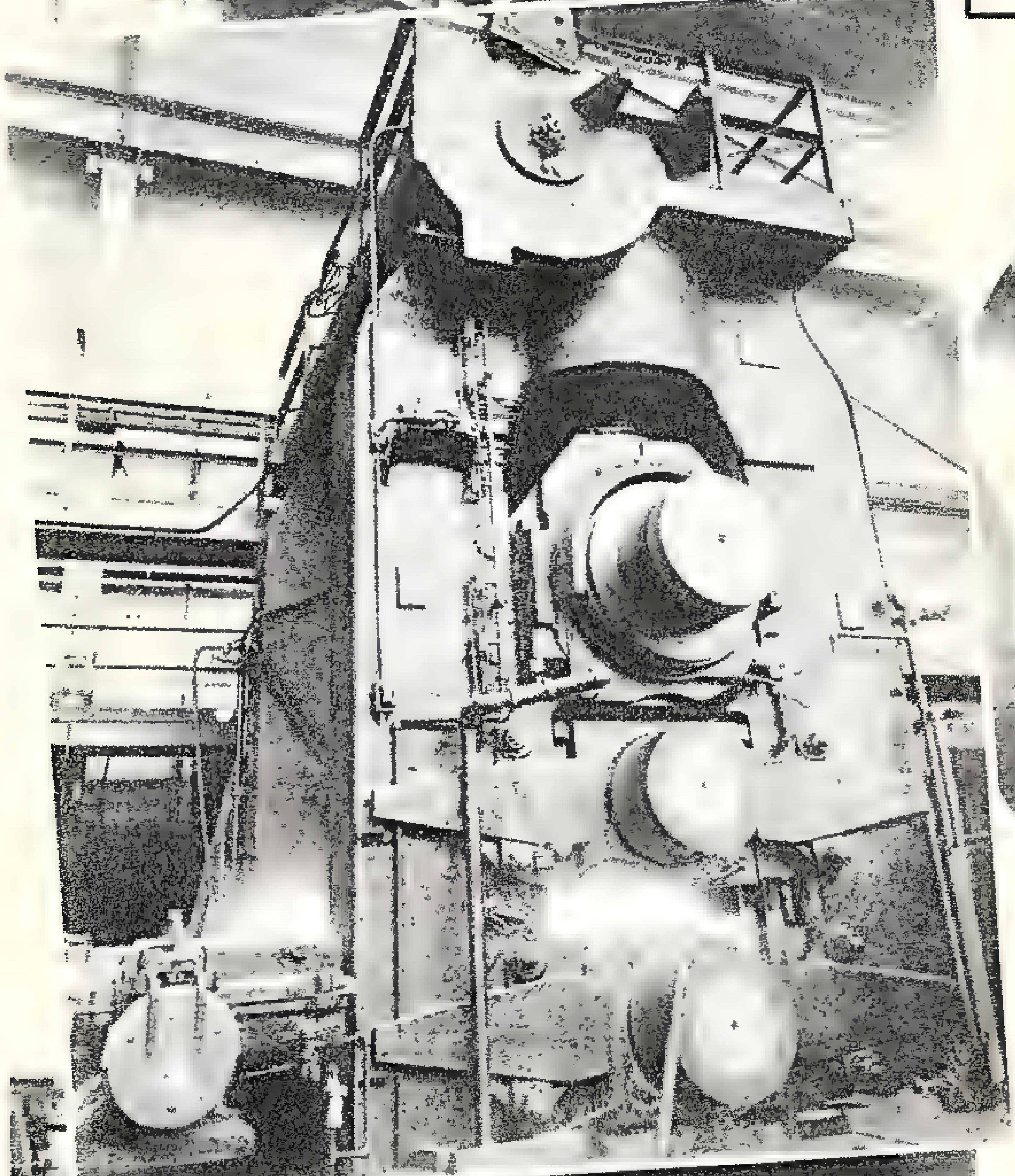


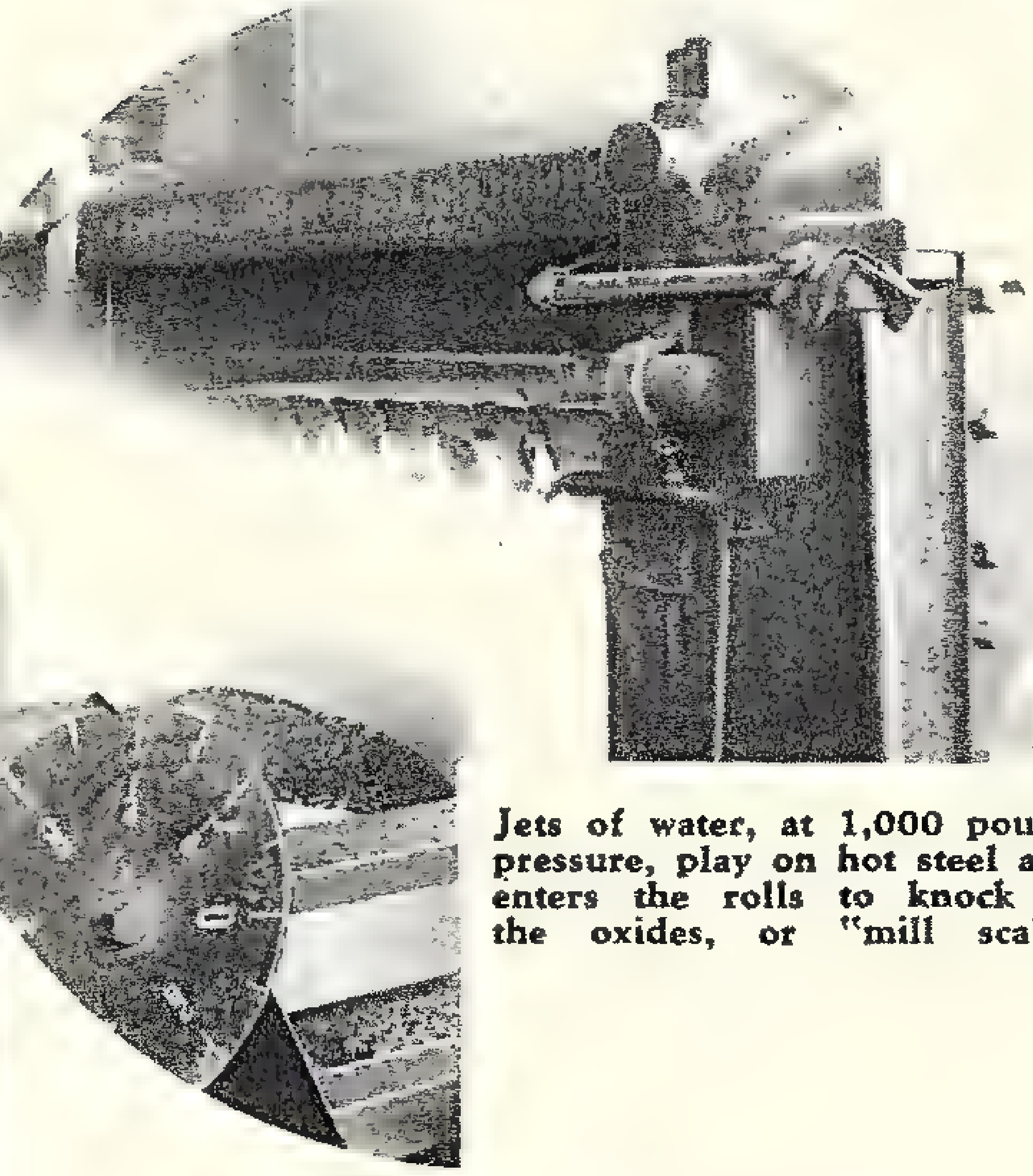
This 70-cell dry battery, 6 feet high, supplies power for one year.

BETHLEHEM Opens New

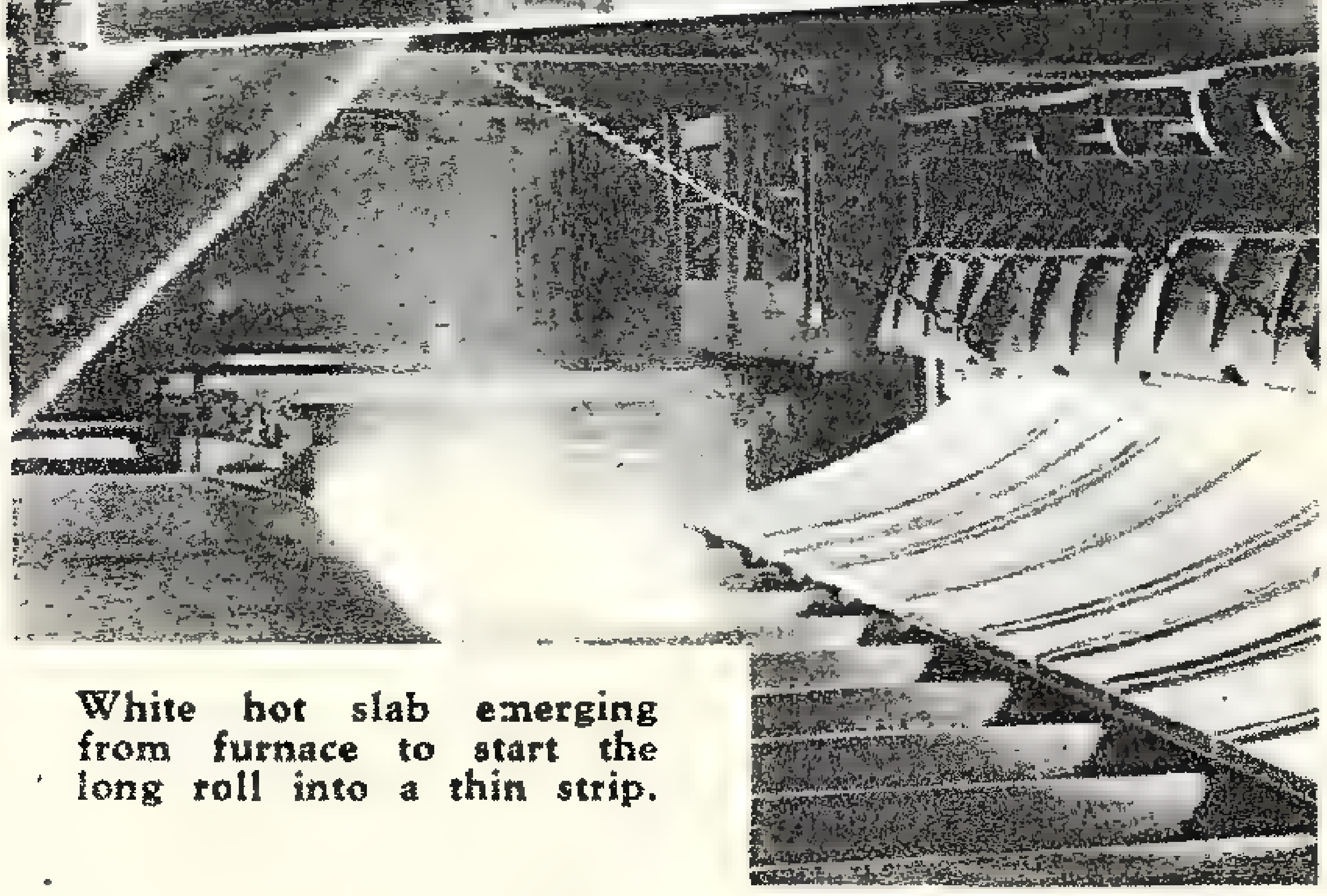


From the roughing rolls shown at left, that receive the thick, hot slab of steel, the metal moves in a continuous ribbon, emerging as finished strip from rollers, above.





Jets of water, at 1,000 pounds pressure, play on hot steel as it enters the rolls to knock off the oxides, or "mill scale."



White hot slab emerging from furnace to start the long roll into a thin strip.

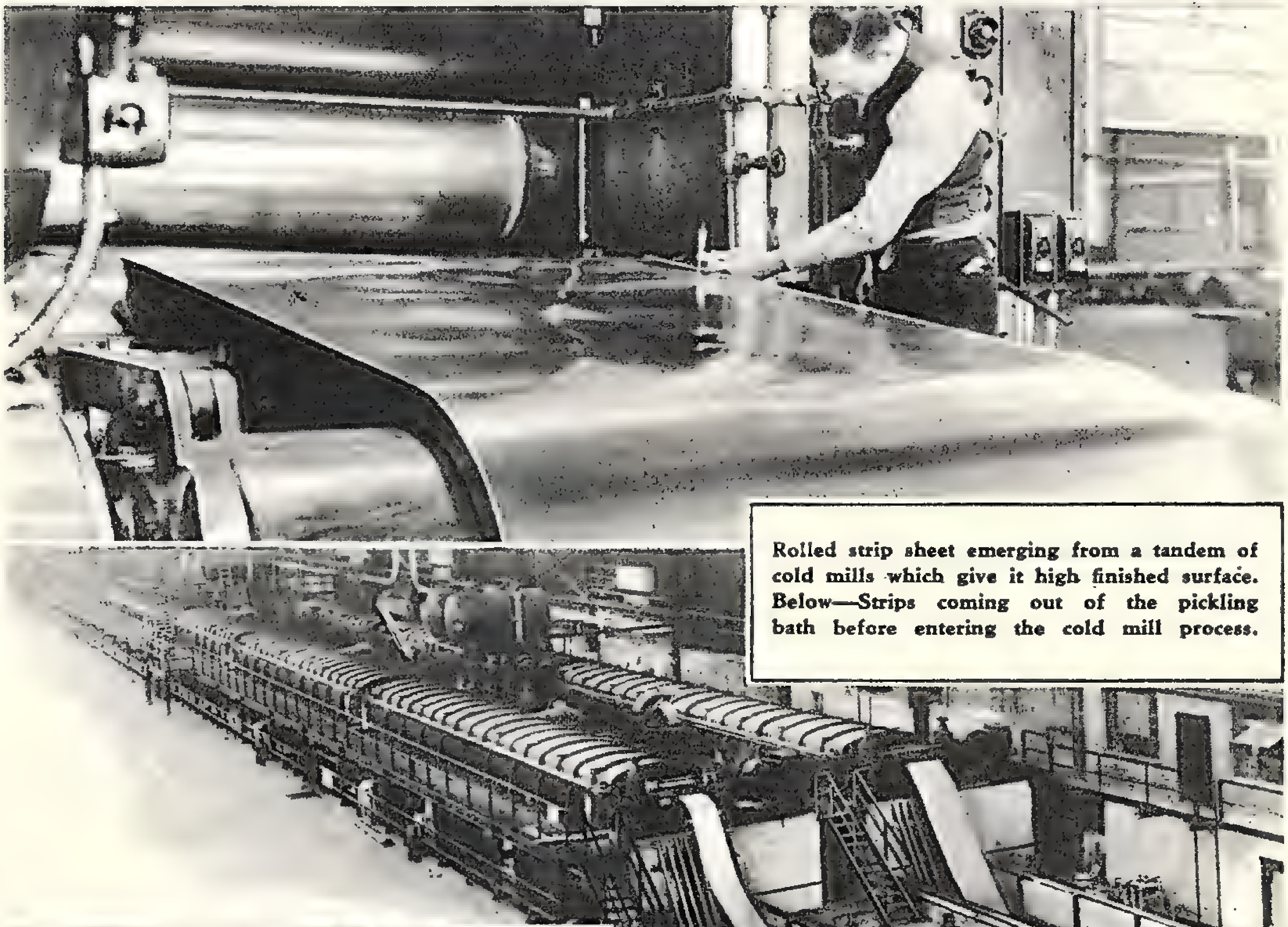
by Watson Davis

MAN and machine reach new heights of co-ordination in a new $20,000,000 steel strip mill of the Bethlehem Steel Co., at Lackawanna, N. Y., near Buffalo. Human brains and skill, both in design and operation, combine with precise and delicate control of large electrical power to roll a thick slab into a lengthy strip of sheet metal in a few minutes.

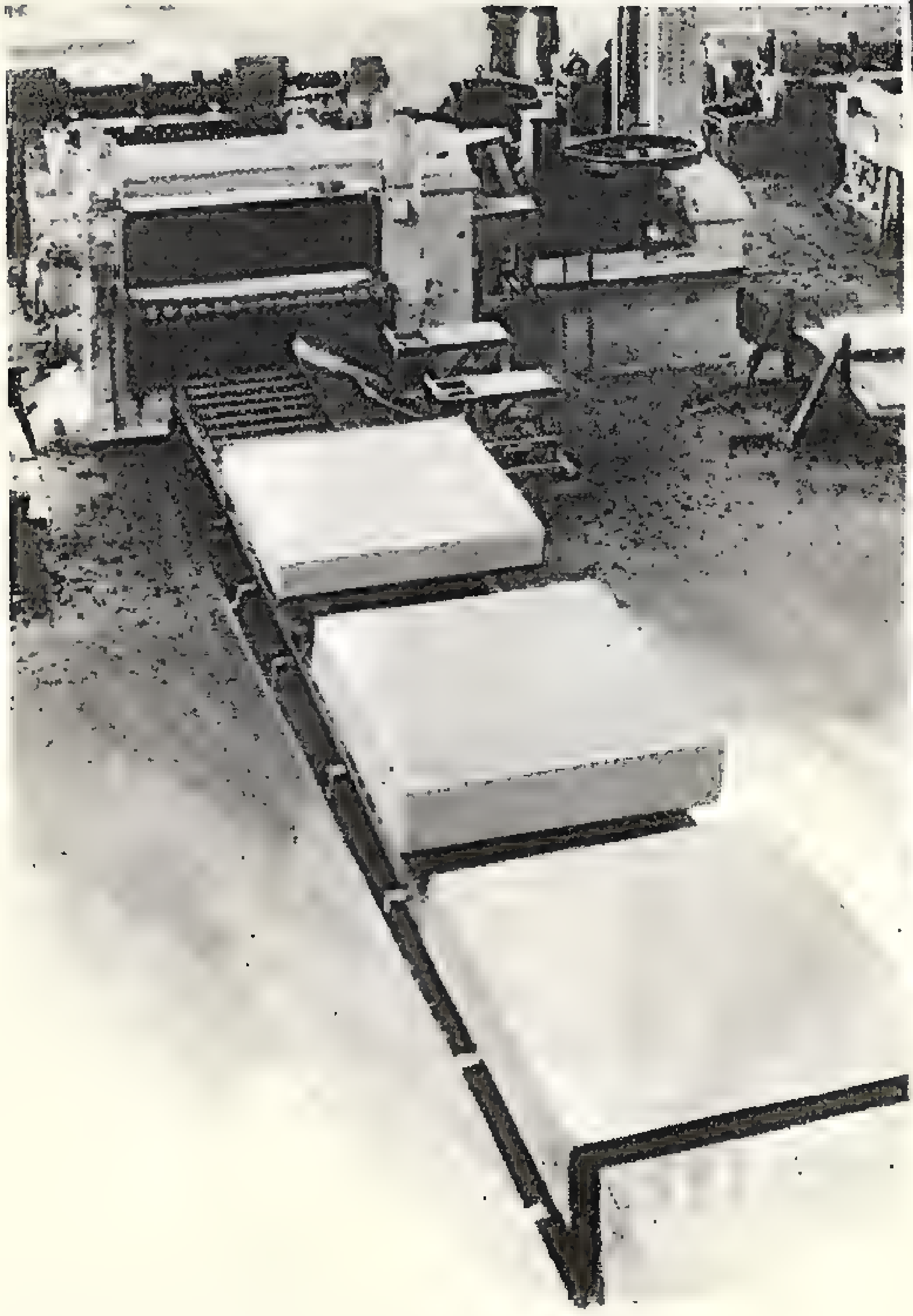
To see a red-hot chunk of steel pass successively through eleven huge sets

[*Continued on page* 128]

$20,000,000 MILL

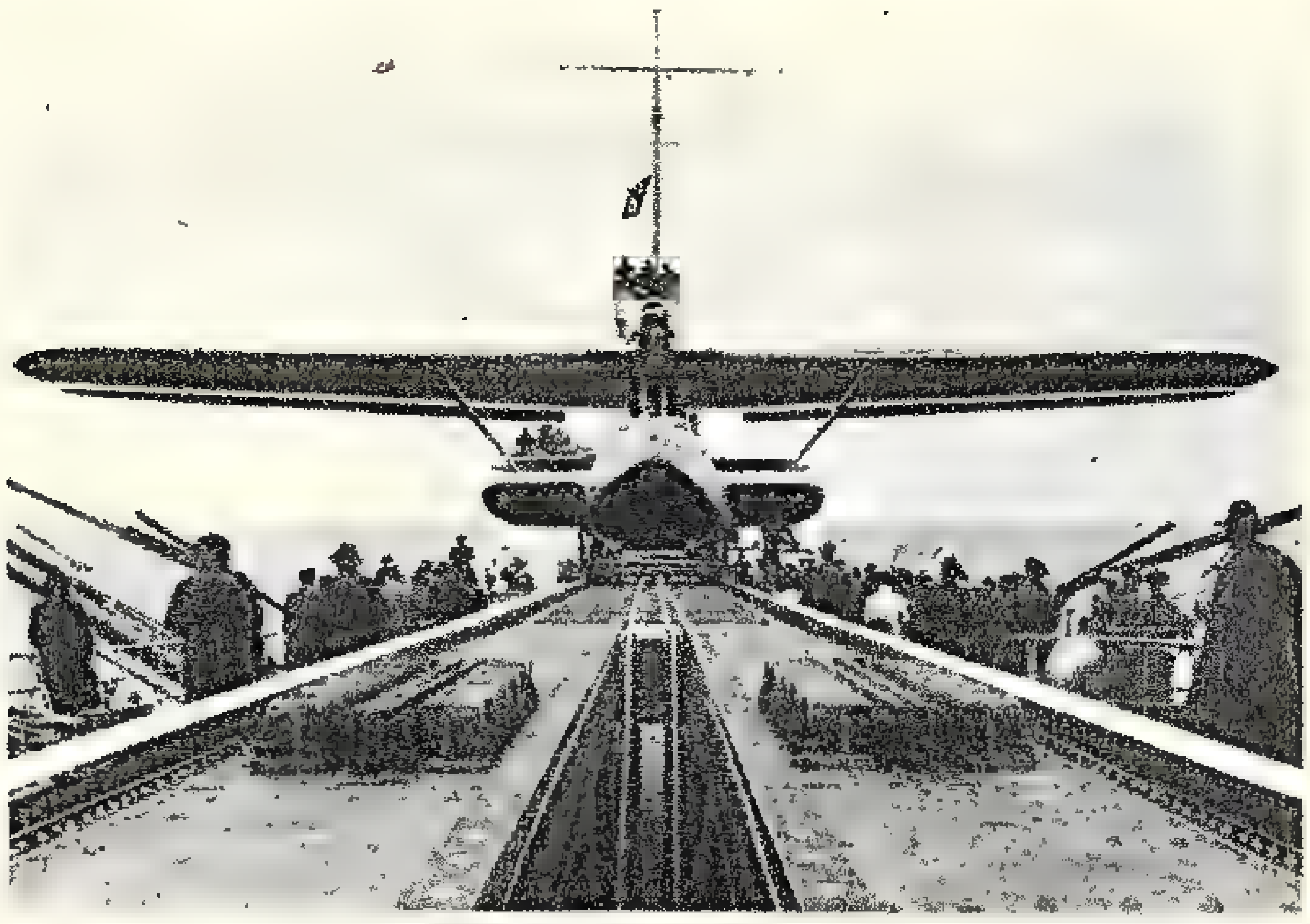


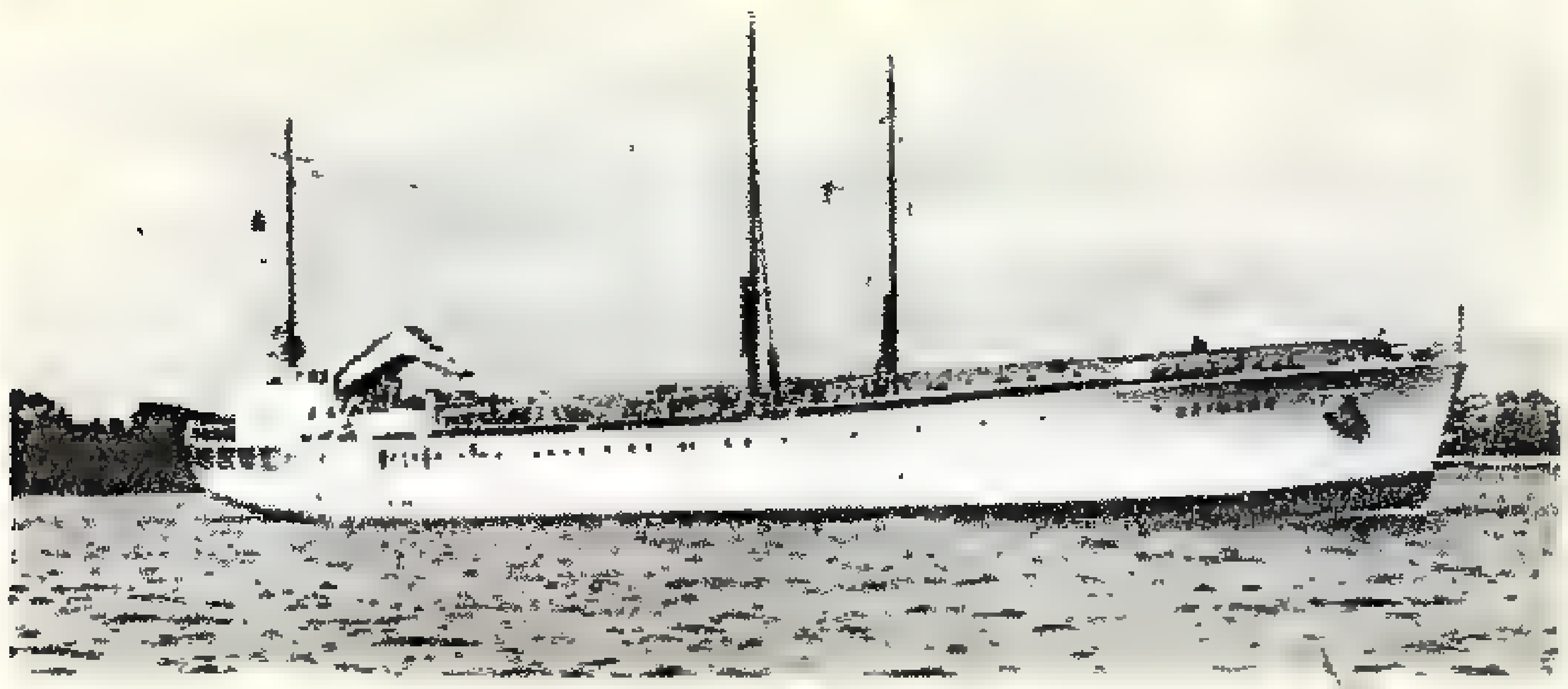
Rolled strip sheet emerging from a tandem of cold mills which give it high finished surface. Below—Strips coming out of the pickling bath before entering the cold mill process.



The finished product ready for cold-forming into auto bodies and hundred-and-one other products. It is shipped in flat sheets, as at left, and in coils weighing tons each.

Floating Aerodromes Speed Trans-Ocean Flights





With improved air service between South America and South Africa it was found necessary to construct this second floating aerodrome, the "Ostmark." Planes are catapulted from deck.

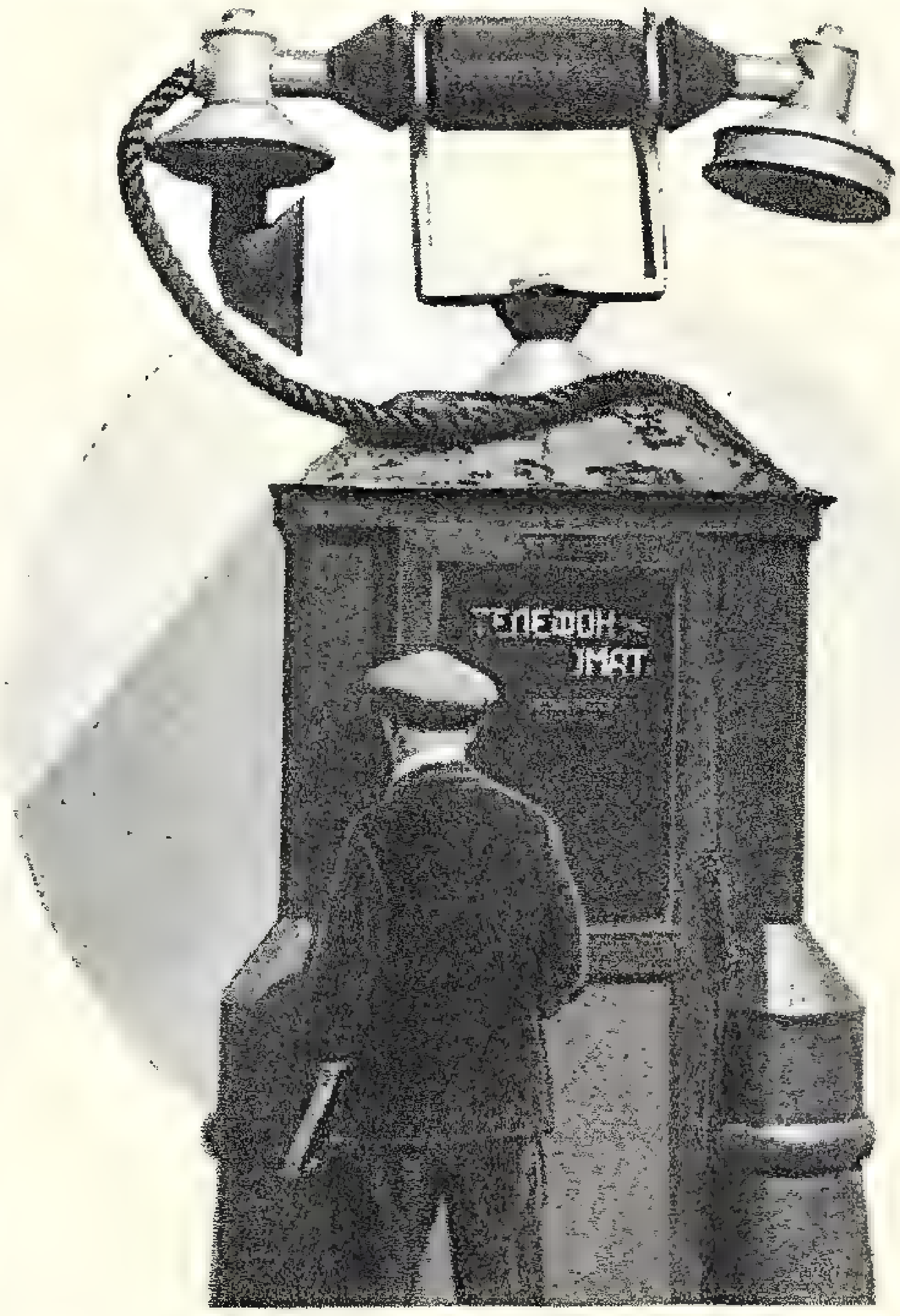
WITH the construction of a new fleet of planes for the South Africa-South America service, at the Dornier Works in Germany, the service has been improved to such an extent that a new sea aerodrome has been placed in service near the South American coast. Christened the "Ostmark," the craft is equipped with complete radio apparatus for sending weather reports to the planes in flight. In landing the express planes light on the water and are lifted to the "Ostmark's" deck by a huge crane. After being refueled the planes are placed on a hydraulic catapult and "shot" into flight to continue on their way. Three aerodromes are employed for this ocean air service since one ship must always be undergoing dry dock repairs.

Grandfather Wins Air Race

AN AIR meet recently staged at Bradford, Pa., featured only flyers who were grandfathers. The race, which was over a 25-mile course, was won by 62-year-old Paul Lyon who narrowly scored over Harold Sherrick, a youngster of 49; the grandfather of six children. The air meet was sponsored by the recently organized "Flying Grandfathers Association" with headquarters at Bradford. Among the entries was 71-year-old George Metzger of Emporium, Pa., who handled his plane like a youthful pilot.

Winner of what is believed to be the first grandfathers' air race is Paul Lyon, who is shown here with his wife, daughter and grandson. Race was staged over a twenty-five-mile course.

Russia Builds Phone Booths



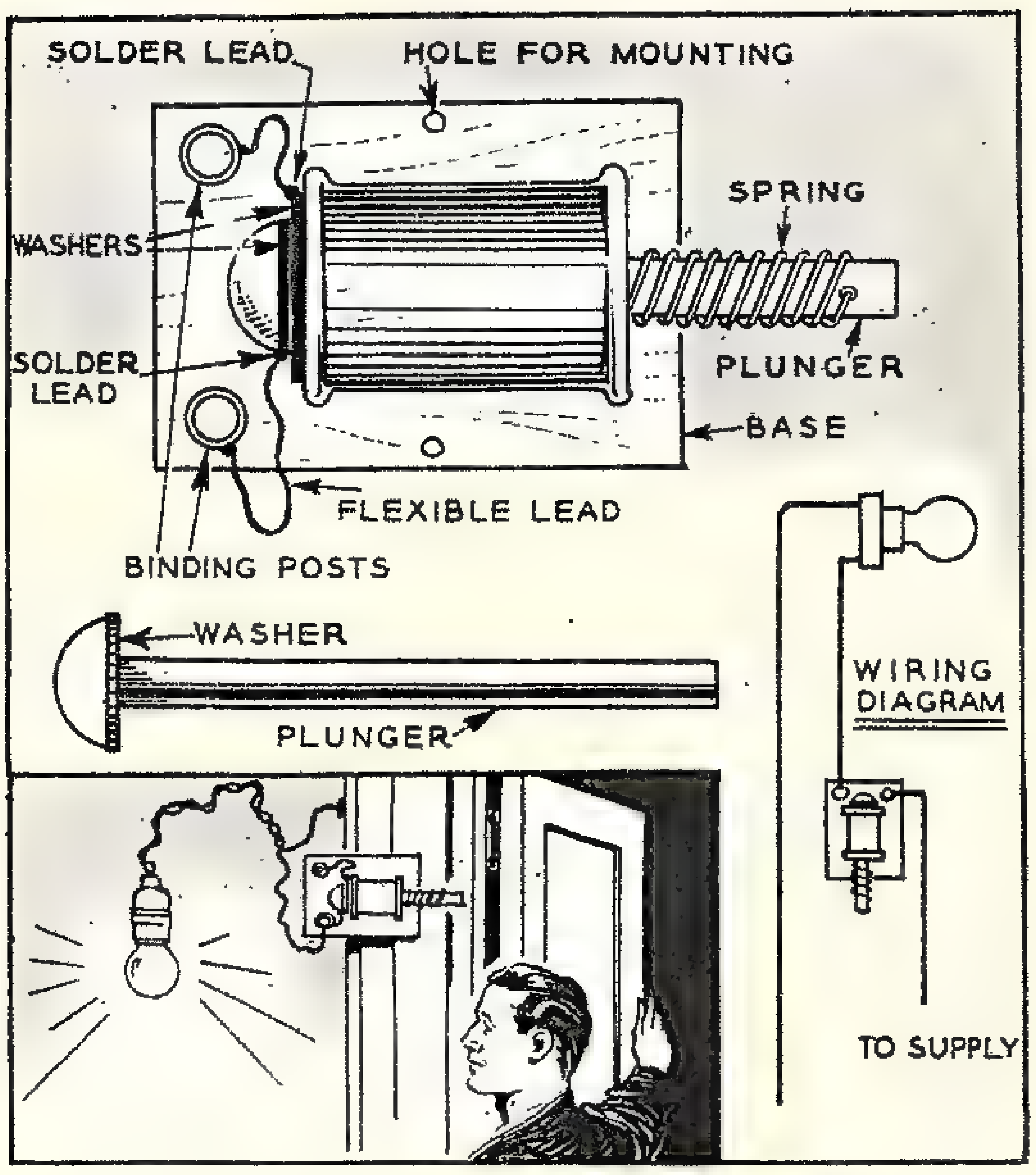
Telephone pay stations aren't difficult to locate in Russia. Giant hand sets like this one have been erected on the roofs of phone booths to popularize service. Phones are of sheet metal.

IN ORDER to popularize telephone service in that country the Russian government has placed public telephone booths on the streets of all large cities. In order that they would attract the public's eye, large hand phones were made from sheet metal and erected on the roofs of the pay stations.

RADIO SPARKS and ELECTRICAL EXPERIMENTS

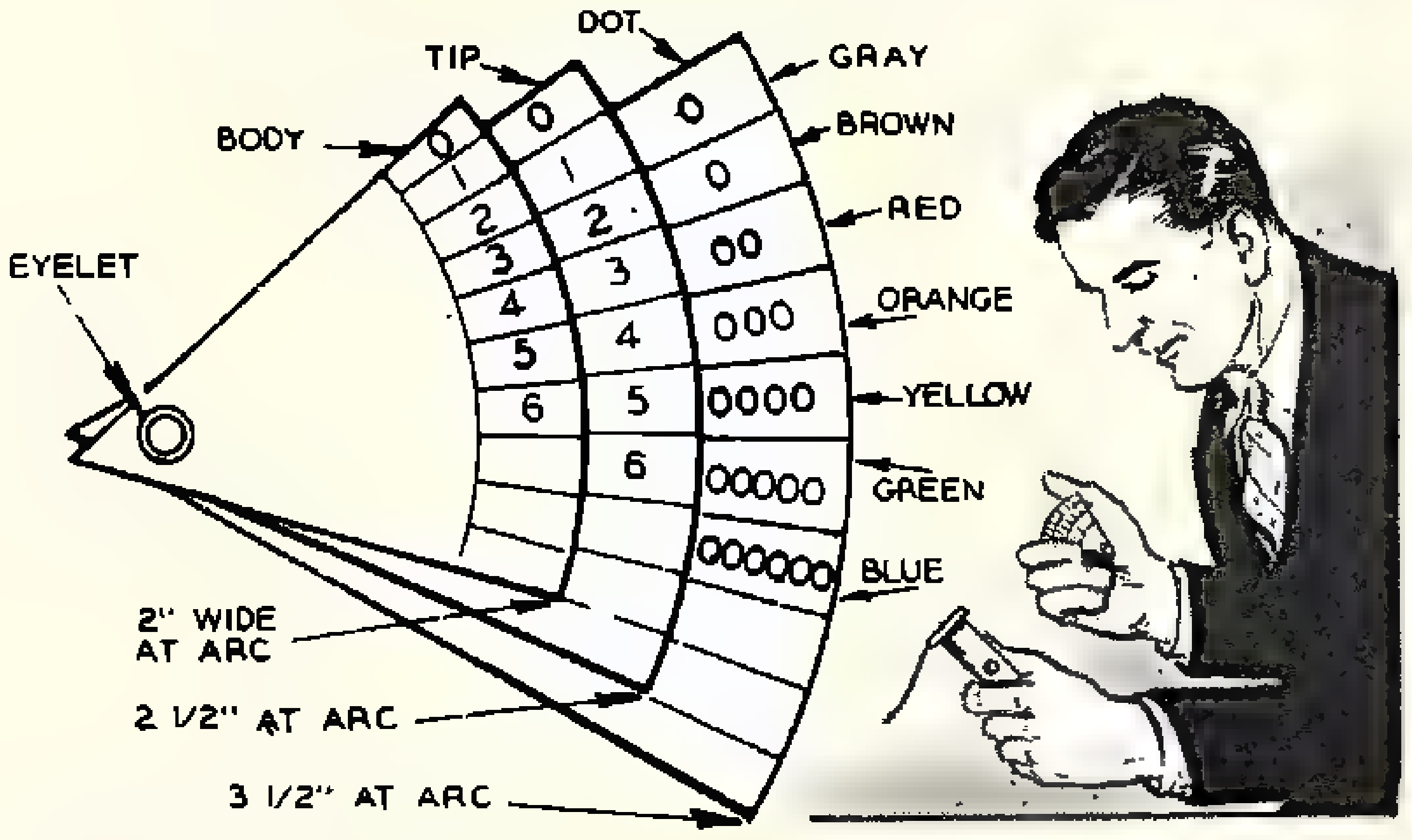
Spool Is Automatic Switch

A SWITCH that will automatically turn on the lights in a closet when the door is opened can be made from a cotton thread spool and a few other parts which are certain to be found about the home. Mount the spool on a block of wood. To one end of the spool cement a large brass washer and connect it to a terminal post with a length of wire. Secure a wooden dowel rod just large enough to slide inside the spool and force a slightly smaller brass washer over one end. Solder a length of flexible wire to this washer and connect it to the remaining binding post. Drill a hole in the opposite end of the wooden dowel so that the end of a wire spring may be inserted and locked in place. Insert switch in light circuit.


SOLDER LEAD
HOLE FOR MOUNTING
SPRING
WASHERS
SOLDER LEAD
PLUNGER
BASE
FLEXIBLE LEAD
BINDING POSTS
WASHER
PLUNGER
WIRING DIAGRAM
TO SUPPLY

With this automatic closet switch installed just inside the door it is no longer necessary to fumble in the dark for switches. Spool, brass washers, spring and wood dowel comprise parts.

Chart Identifies Resistors


DOT
TIP
BODY
EYELET
GRAY
BROWN
RED
ORANGE
YELLOW
GREEN
BLUE
0
1
2
3
4
5
6
0
1
2
3
4
5
6
0
00
000
0000
00000
000000
2" WIDE AT ARC
2 1/2" AT ARC
3 1/2" AT ARC

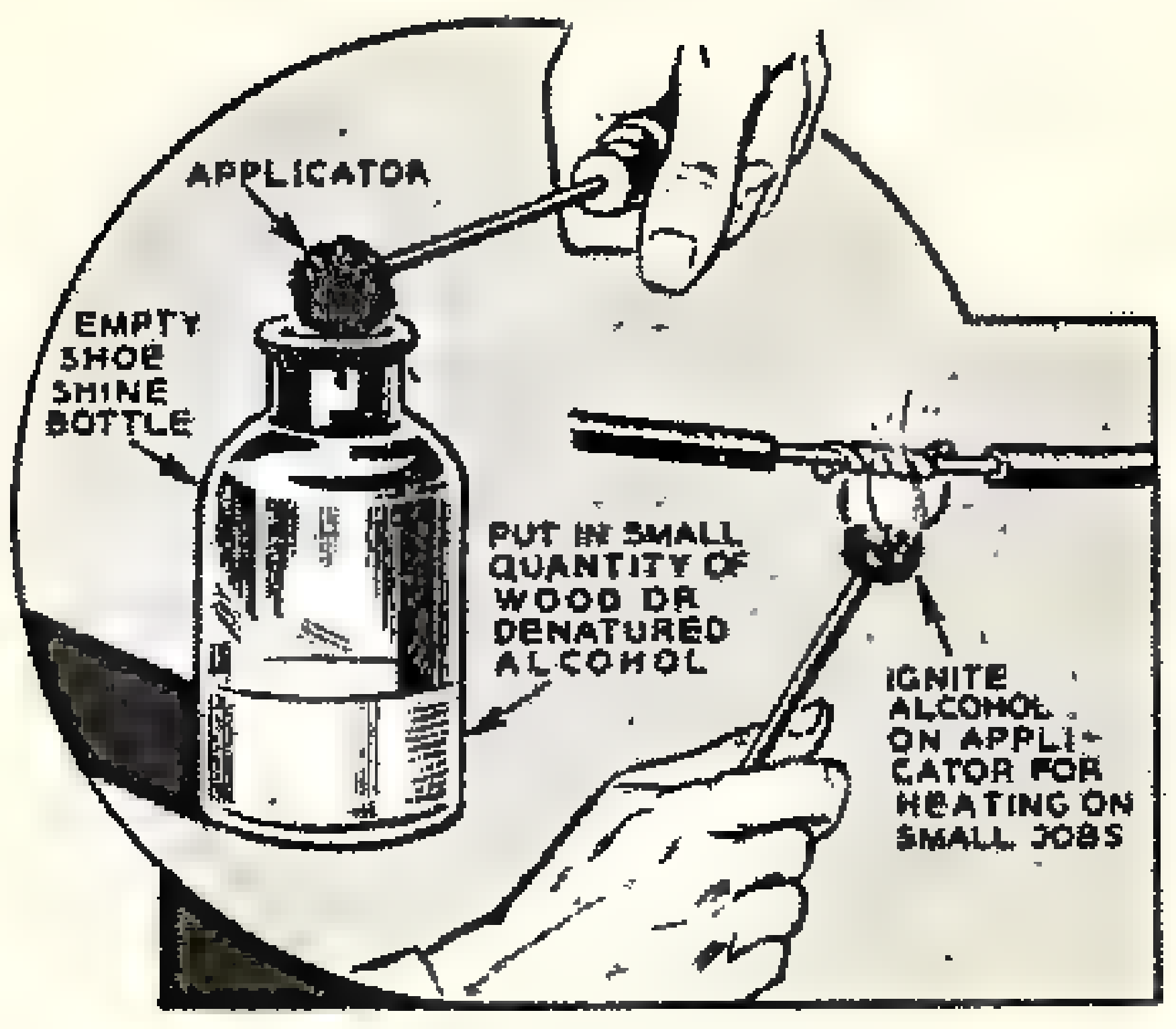
Cut from three pieces of cardboard this handy chart identifies the resistance of carbon color coded resistors as used in radio and electrical experiments. Paint divisions in colors indicated.

A CHART for identifying color coded resistors can be used for many experimental purposes in the workshop. Cut three cardboard angles to the sizes given and number each one from one to nine. Paint each numbered space in the color indicated and then assemble in fan-like fashion with either an eyelet or dress fastener. To use, arrange colors on chart to correspond with those on resistance. Numbers on colored spaces indicate ohms.

Polish Bottle Is Handy Torch

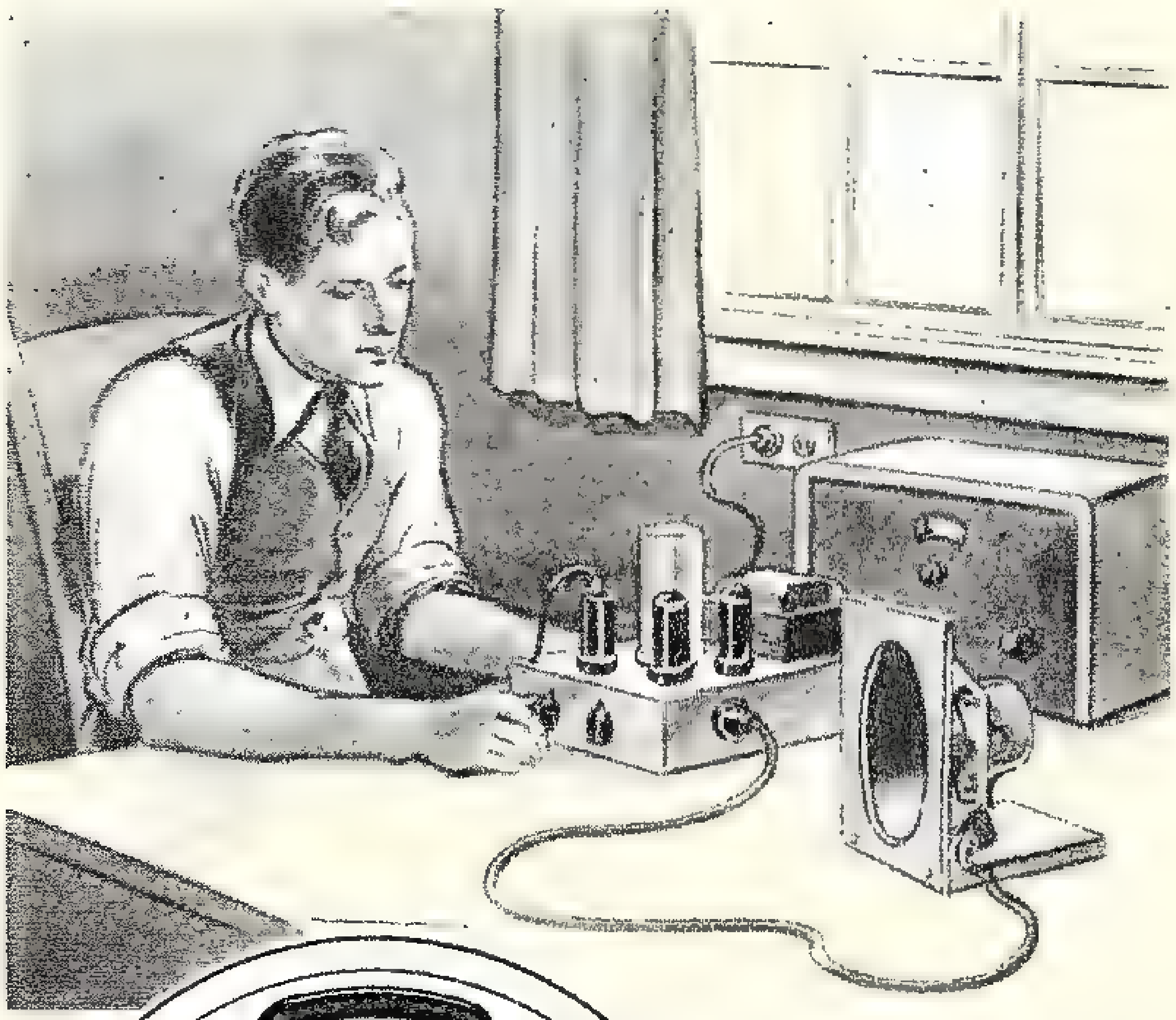
IN WORKING outdoors or in other places where a soldering iron is not available a simple torch for soldering can be used effectively. The torch is simplicity itself and consists of an empty shoe dressing bottle which has been partly filled with denatured alcohol.

The applicator is saturated in the fluid and a match applied to it. The torch will produce a hot flame which will prove sufficient for all kinds of light soldering work. When using a torch of this type it is a wise idea to use a solder which is prepared in a paste form and applied to joint to be soldered.


APPLICATOR
EMPTY SHOE SHINE BOTTLE
PUT IN SMALL QUANTITY OF WOOD OR DENATURED ALCOHOL
IGNITE ALCOHOL ON APPLICATOR FOR HEATING ON SMALL JOBS

An empty shoe dressing bottle partly filled with denatured alcohol makes a practical torch for soldering splices in house wiring.

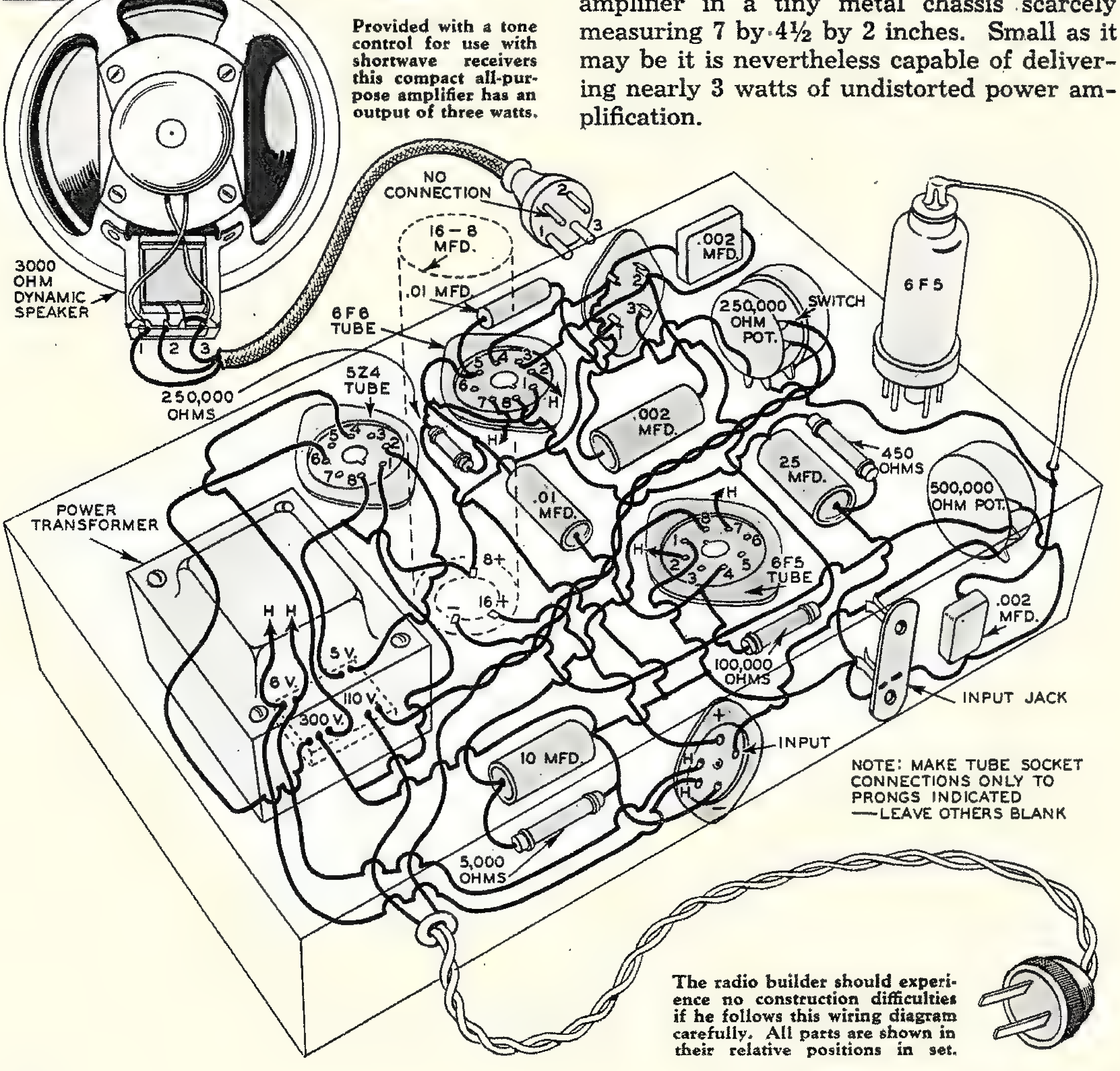
TINY AMPLIFIER FEATURES



This compact metal tube amplifier provides both B power and speaker volume for small sets.

EVERY radio experimenter has occasion at some time to use an amplifier; especially if he owns a small two or three-tube short wave receiver. Until a few years ago any amplifier that had the least bit of output was a bulky affair weighing at least 25 pounds. With the improvements in radio design which have been made during the last few years it is now possible to construct a powerful little amplifier in a tiny metal chassis scarcely measuring 7 by 4½ by 2 inches. Small as it may be it is nevertheless capable of delivering nearly 3 watts of undistorted power amplification.

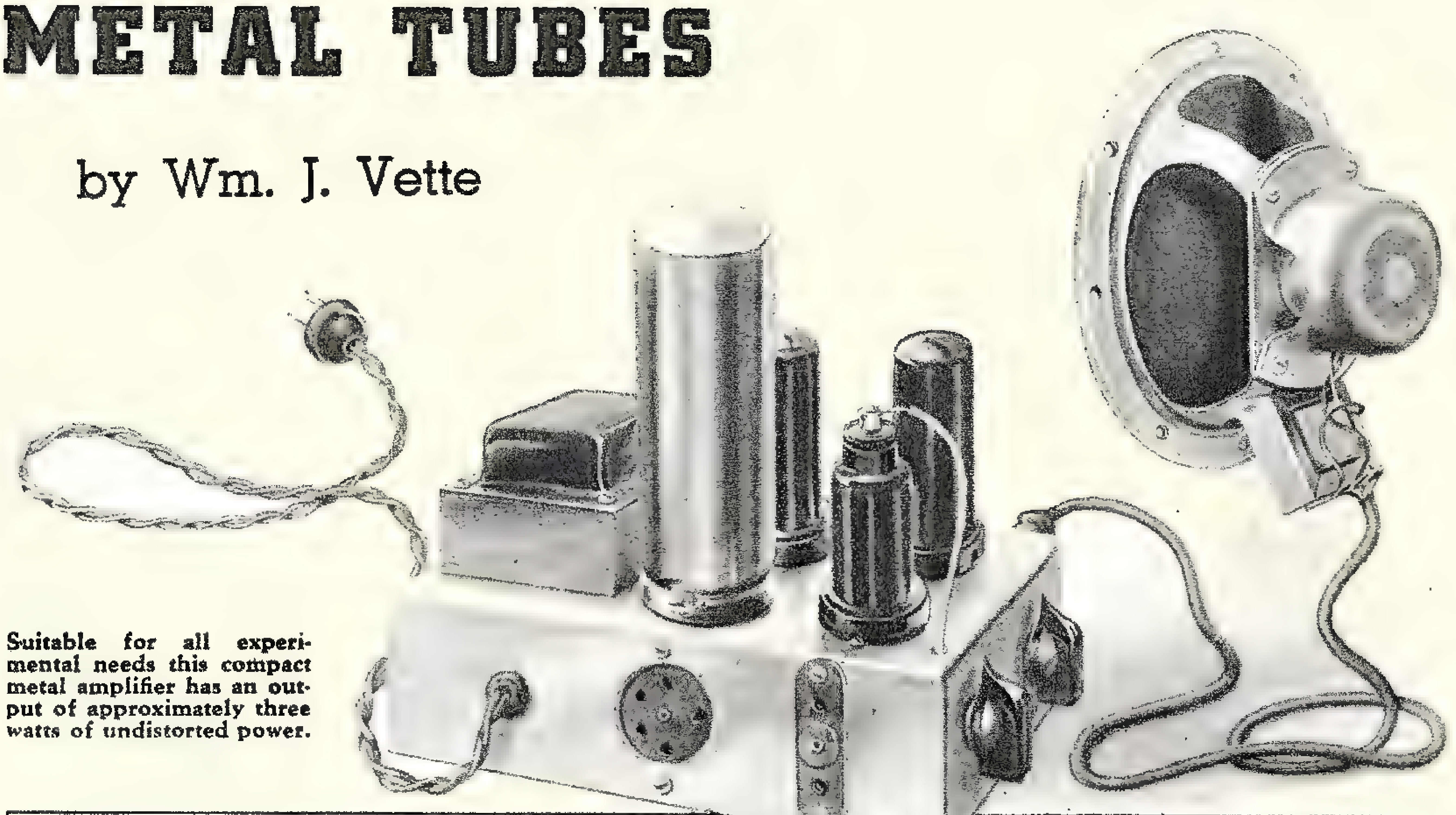
Provided with a tone control for use with shortwave receivers this compact all-purpose amplifier has an output of three watts.


3000 OHM DYNAMIC SPEAKER
1
2
3
NO CONNECTION
16 — 8 MFD.
.01 MFD.
.002 MFD.
6F6 TUBE
250,000 OHM POT.
SWITCH
6F5
5Z4 TUBE
250,000 OHMS
.002 MFD.
H
25 MFD.
450 OHMS
.01 MFD.
500,000 OHM POT.
POWER TRANSFORMER
8+
16+
6F5 TUBE
.002 MFD.
H H
5 V.
6 V.
110 V.
300 V.
100,000 OHMS
INPUT JACK
INPUT
10 MFD.
5,000 OHMS
NOTE: MAKE TUBE SOCKET CONNECTIONS ONLY TO PRONGS INDICATED —LEAVE OTHERS BLANK

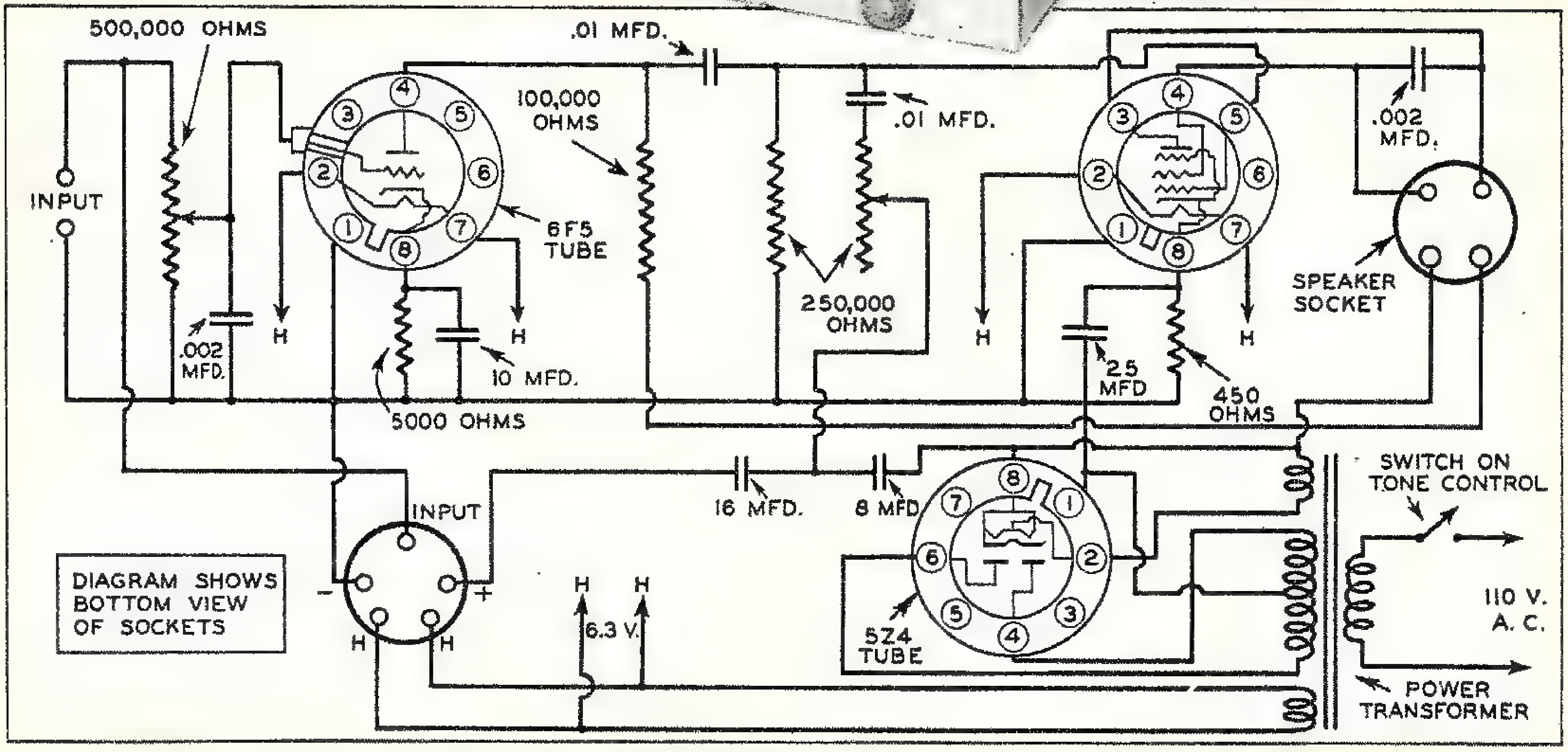
The radio builder should experience no construction difficulties if he follows this wiring diagram carefully. All parts are shown in their relative positions in set.

METAL TUBES

by Wm. J. Vette



Suitable for all experimental needs this compact metal amplifier has an output of approximately three watts of undistorted power.


500,000 OHMS
.01 MFD.
100,000 OHMS
.01 MFD.
.002 MFD.
INPUT
6F5 TUBE
SPEAKER SOCKET
250,000 OHMS
H
.002 MFD.
10 MFD.
5000 OHMS
25 MFD
450 OHMS
SWITCH ON TONE CONTROL
INPUT
16 MFD.
8 MFD
DIAGRAM SHOWS BOTTOM VIEW OF SOCKETS
6.3 V.
5Z4 TUBE
110 V. A. C.
POWER TRANSFORMER
1
2
3
4
5
6
7
8
-
+

If this schematic wiring diagram is followed along with the pictorial hook-up there is little chance for errors to occur. Note that the tube prongs are not all connected in the circuit since some are blank. Tube sockets, above, show the connections as they appear from the bottom of socket; pictorial diagram shows top view.

The construction is begun by forming the chassis from a sheet of alloy metal or aluminum. Of course, sheet iron may be used but it is more difficult to handle. After punching out the holes for the tube sockets, assemble the sockets and proceed to wire up the various parts. Work can be simplified if the pictorial and schematic diagrams are carefully studied before any actual construction is started.

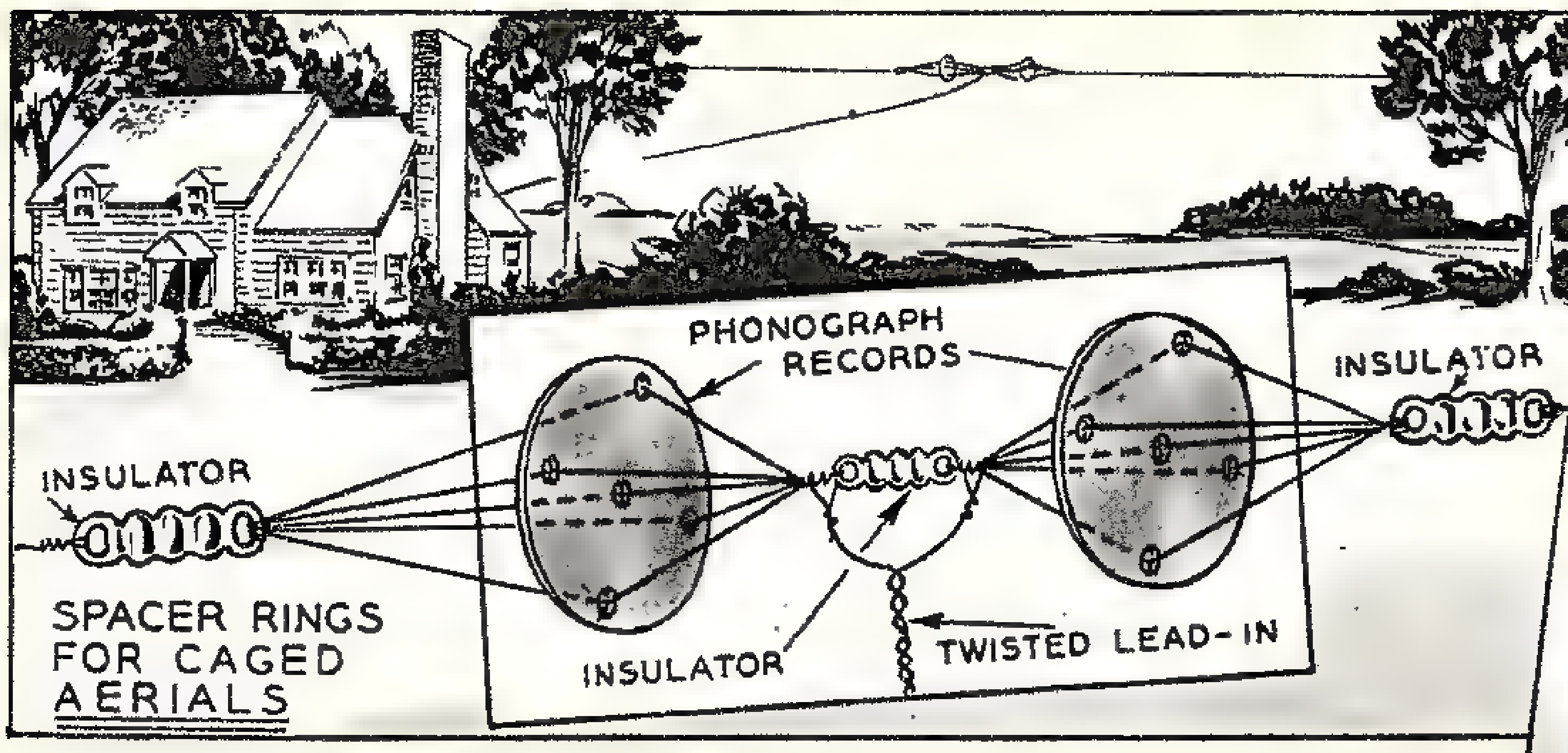
Examination of the circuit will reveal the use of three metal type tubes. A type 6F5 tube is used in the input, a type 6F6 in the output and a type 5Z4 rectifier tube in the power supply circuit. By wiring up these tubes according to the numbers appearing on the prongs in both the pictorial and schematic diagrams no difficulties will be encountered.

In order to operate the amplifier at its peak efficiency a novel code tone control is employed. One potentiometer serves as code tone control while the other is used to regulate volume. The volume control is fitted with an A. C. switch so that one control turns on the power and regulates the volume of the receiver as well.

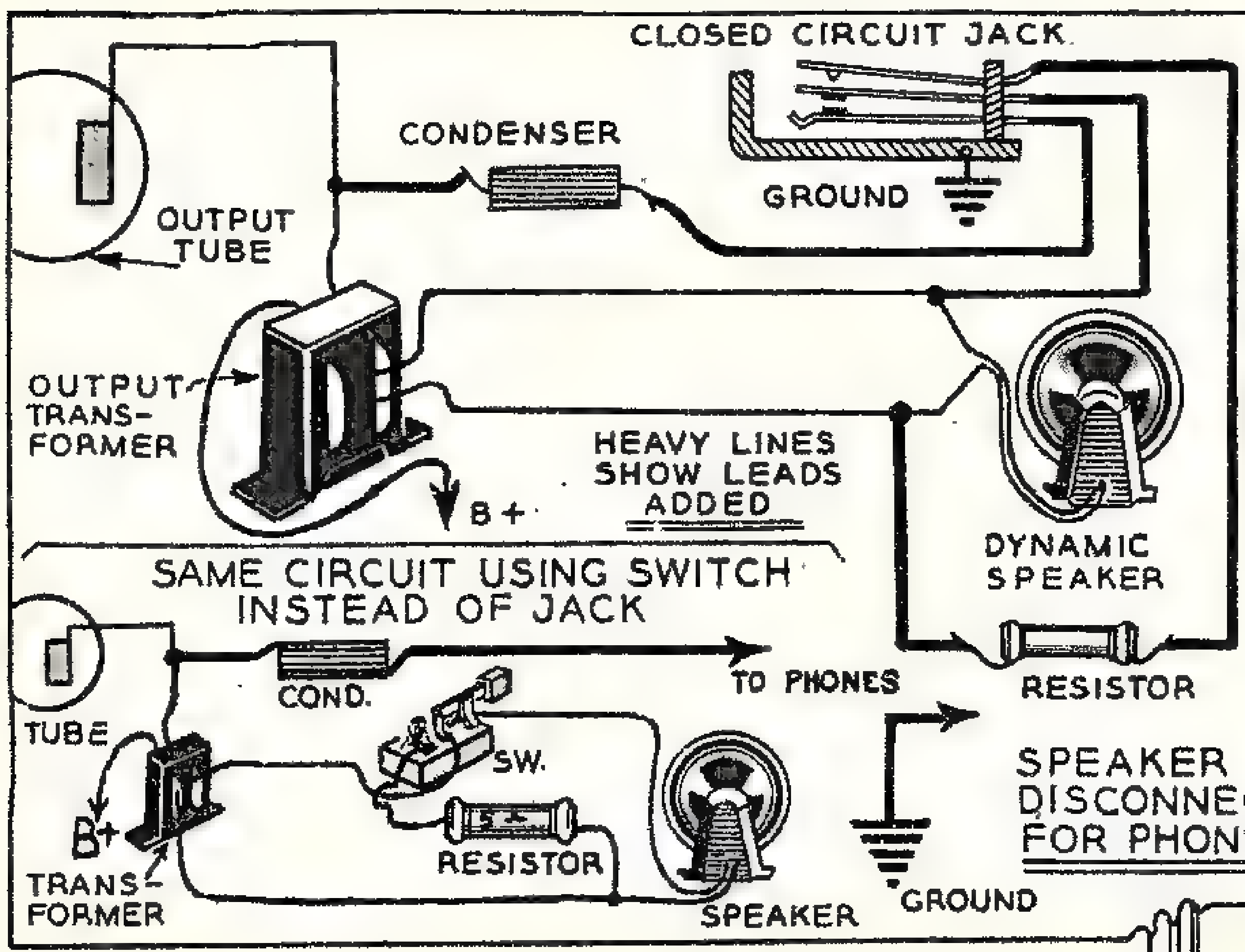
A unique feature of this amplifier is the self-contained B and filament power supply for supplying current to a small short wave

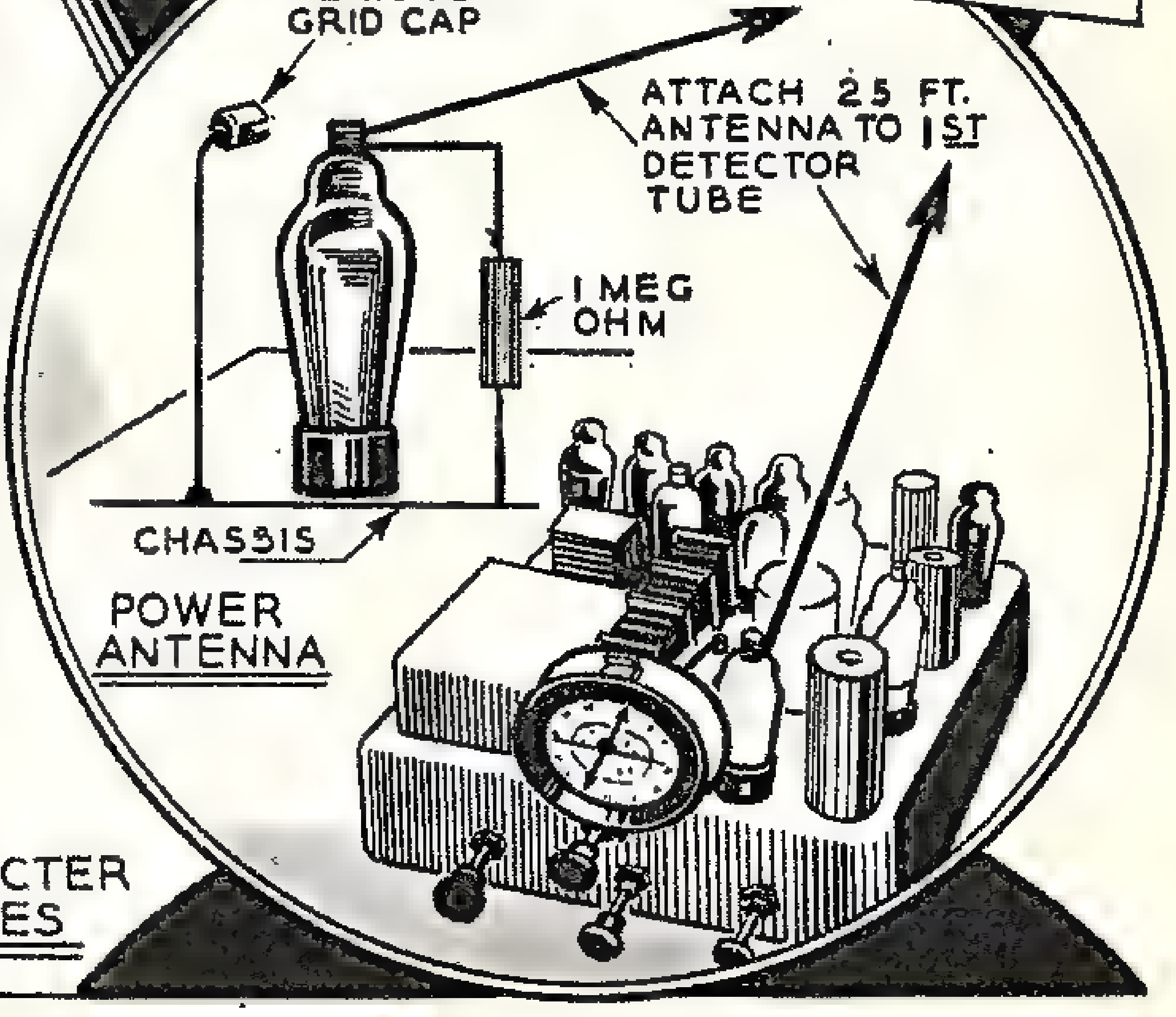
[*Continued on page* 132]

NEW IDEAS FOR THE RADIO FAN


PHONOGRAPH RECORDS
INSULATOR
INSULATOR
SPACER RINGS FOR CAGED AERIALS
INSULATOR
TWISTED LEAD-IN

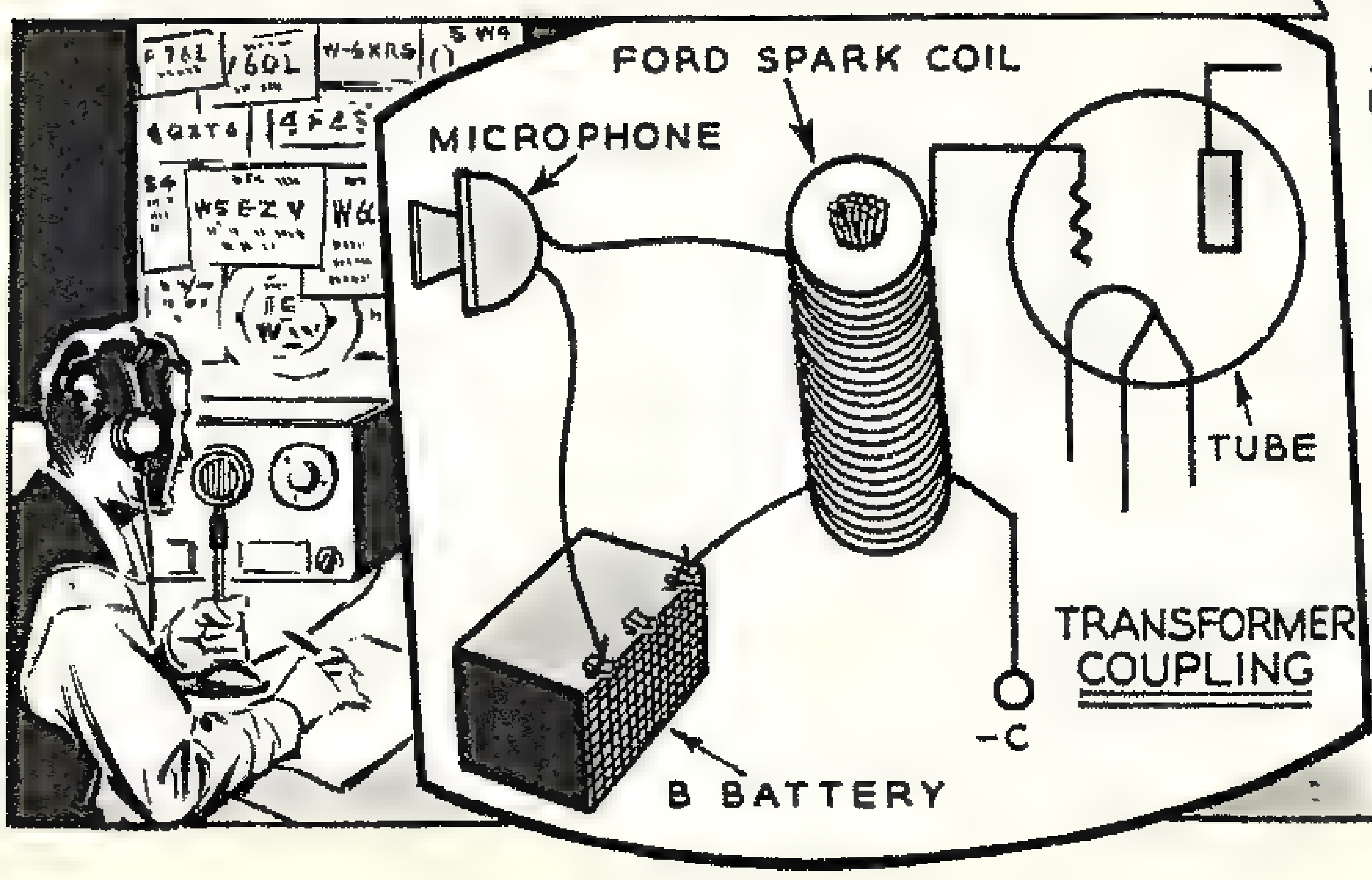
A novel form of DX short wave receiver antenna can be made by using a pair of old phonograph records for spacer insulators. Drill four small holes in each disc just large enough to pass No. 14 antenna wire and wire up the antenna according to the diagram shown above. For the lead-in wire use twisted fixture cord. Connect the antenna to the receiver through a coupling coil.—Morris Katz, Aurora, Ill.

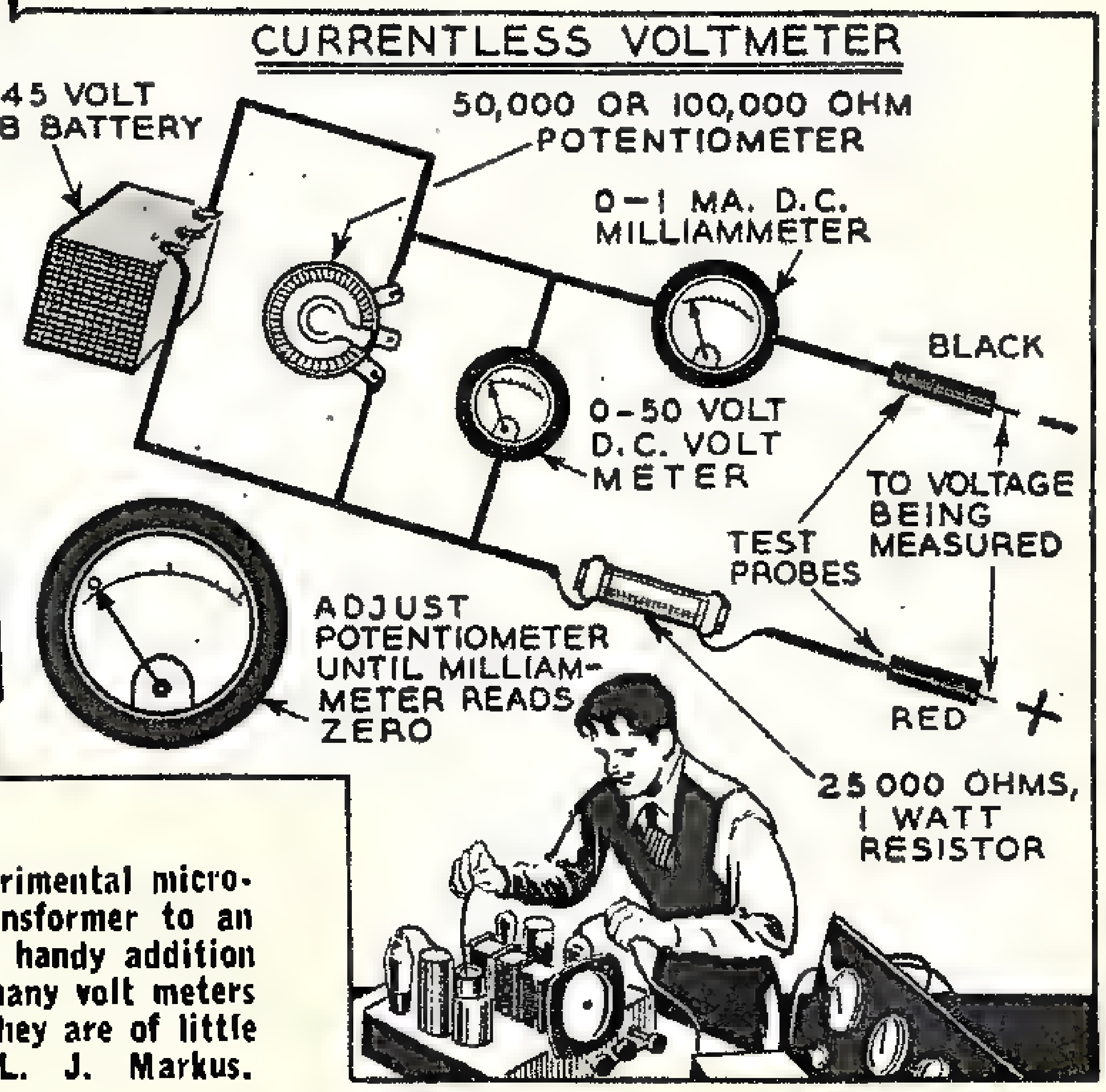

CLOSED CIRCUIT JACK
CONDENSER
GROUND
OUTPUT TUBE
OUTPUT TRANS-FORMER
B+
HEAVY LINES SHOW LEADS ADDED
DYNAMIC SPEAKER
SAME CIRCUIT USING SWITCH INSTEAD OF JACK
RESISTOR
TUBE
COND.
TO PHONES
SW.
B+
TRANS-FORMER
RESISTOR
SPEAKER
GROUND
SPEAKER DISCONNECTER FOR PHONES


REMOVE GRID CAP
ATTACH 25 FT. ANTENNA TO 1ST DETECTOR TUBE
1 MEG OHM
CHASSIS
POWER ANTENNA

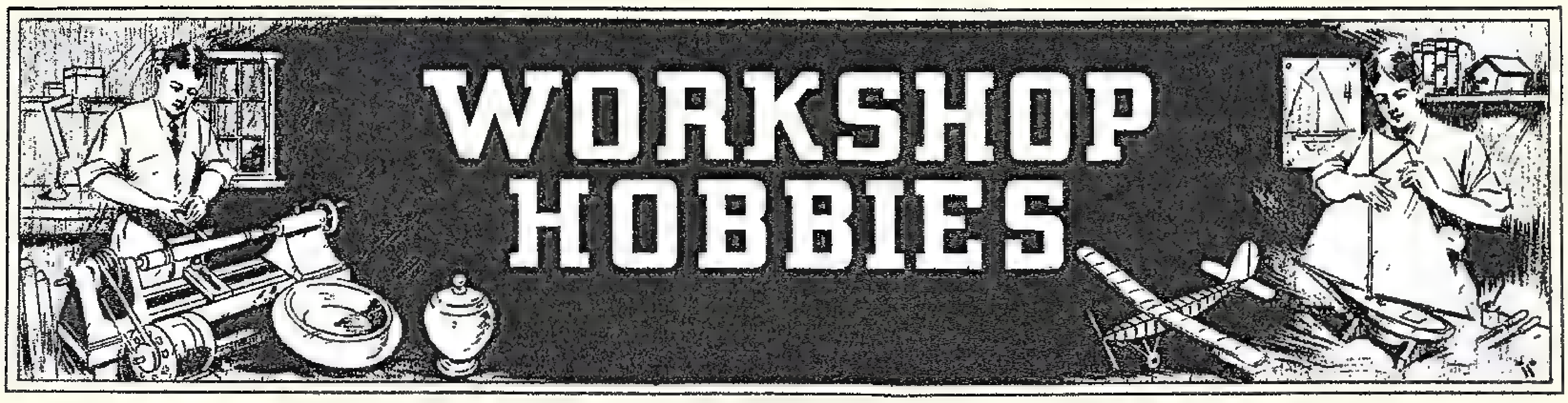
Modern all-wave receivers which are not furnished with an earphone jack can be quickly provided with this valuable attachment by connecting a closed circuit jack in the output of the receiver in the manner described in the diagram pictured above. A 5-ohm, 10-watt resistance shunted across the voice coil of the speaker cuts it out when the earphones are used.—L. J. Markus, Washington, D. C.

Connecting the antenna directly to the grid cap of the first detector tube of your all-wave receiver will increase the volume on low waves considerably. A one meg ohm carbon resistance is connected from ground or chassis of the receiver to the grid clip. Use 25 ft. antenna.—Arno Wilkens, Fleetwood, Pa.


FORD SPARK COIL
MICROPHONE
TUBE
TRANSFORMER COUPLING
-C
B BATTERY


CURRENTLESS VOLTMETER
45 VOLT B BATTERY
50,000 OR 100,000 OHM POTENTIOMETER
0–1 MA. D.C. MILLIAMMETER
BLACK
0–50 VOLT D.C. VOLT METER
TO VOLTAGE BEING MEASURED
TEST PROBES
ADJUST POTENTIOMETER UNTIL MILLIAMMETER READS ZERO
RED
+
25 000 OHMS, 1 WATT RESISTOR

Above—The transformer from a Ford T spark coil unit makes a good experimental microphone coupling transformer. The method of connecting a telephone transformer to an amplifier is described in the illustration. Right—This test assembly is a handy addition to the experimenter's workbench and solves a perplexing problem. Since many volt meters have an internal resistance which prevents accurate voltage measurements they are of little value for ordinary use. This circuit provides accurate readings.—L. J. Markus.

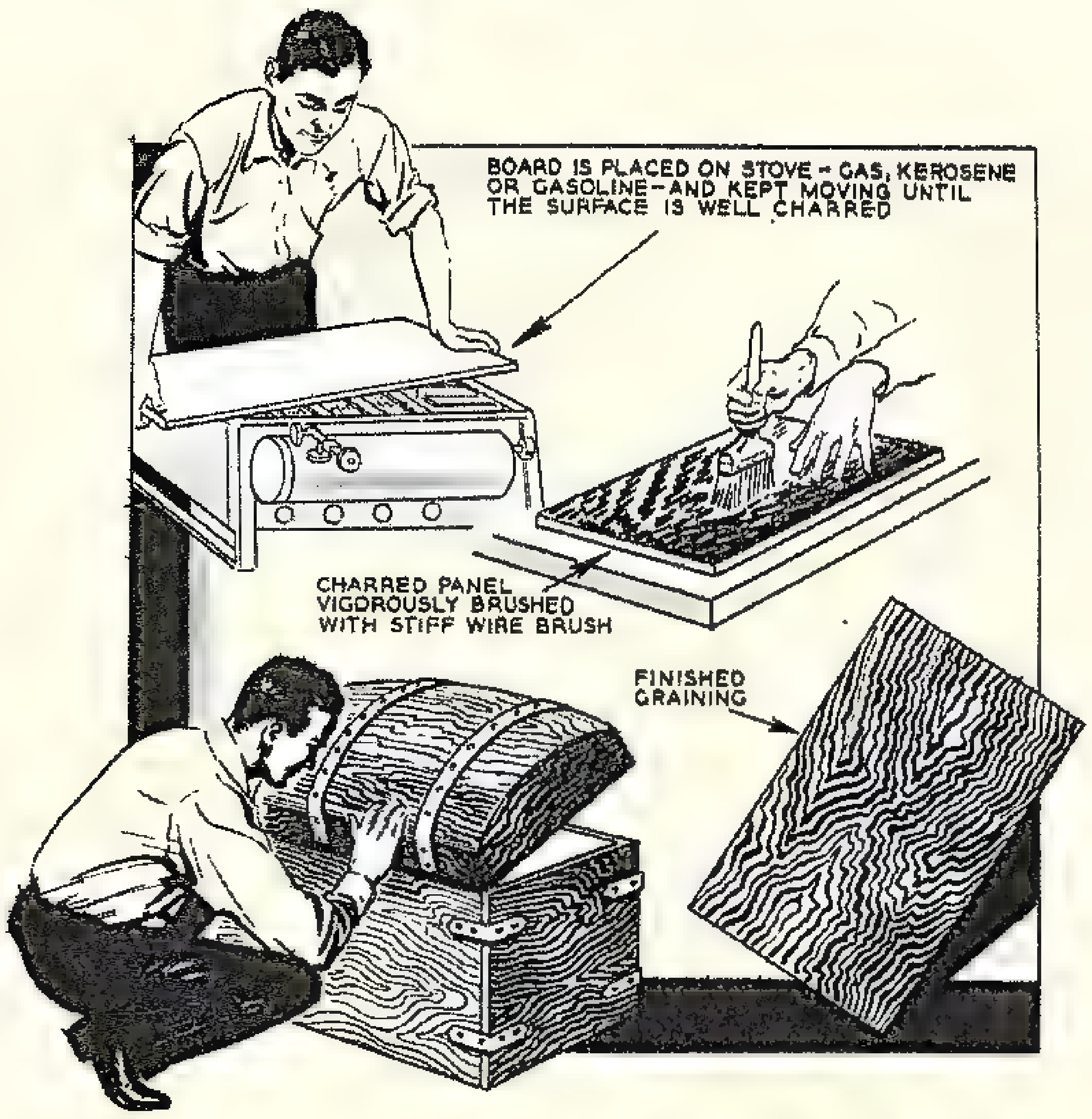

WORKSHOP
HOBBIES

Decorate Woods With Japanese "Sugi" Finish

BEAUTIFUL cabinets, panels and other articles with a finish similar to that of aged driftwood can be produced in the home workshop by anyone the least bit handy with tools. The finish which the Japanese have made famous as "Sugi" is best produced on a medium hard wood such as cyprus although white pine and similar woods can be used.

To produce the "Sugi" finish place the wood over a flame for about five minutes, or long enough for its surface to turn black. Remove the wood from the flame and briskly rub a wire brush over the charred surface following the direction of the grain. Brush away the burned wood until a chocolate color results then apply a coat of clear varnish to this surface. The varnish will bring out the grain revealing a beautiful surface equal to the Japanese finish, itself.

Many attractive home decorations can be made from wood which has first been prepared in the manner described above. On hard woods it may be necessary to burn the surface several times after the initial scraping until the correct color and grain effect is obtained.

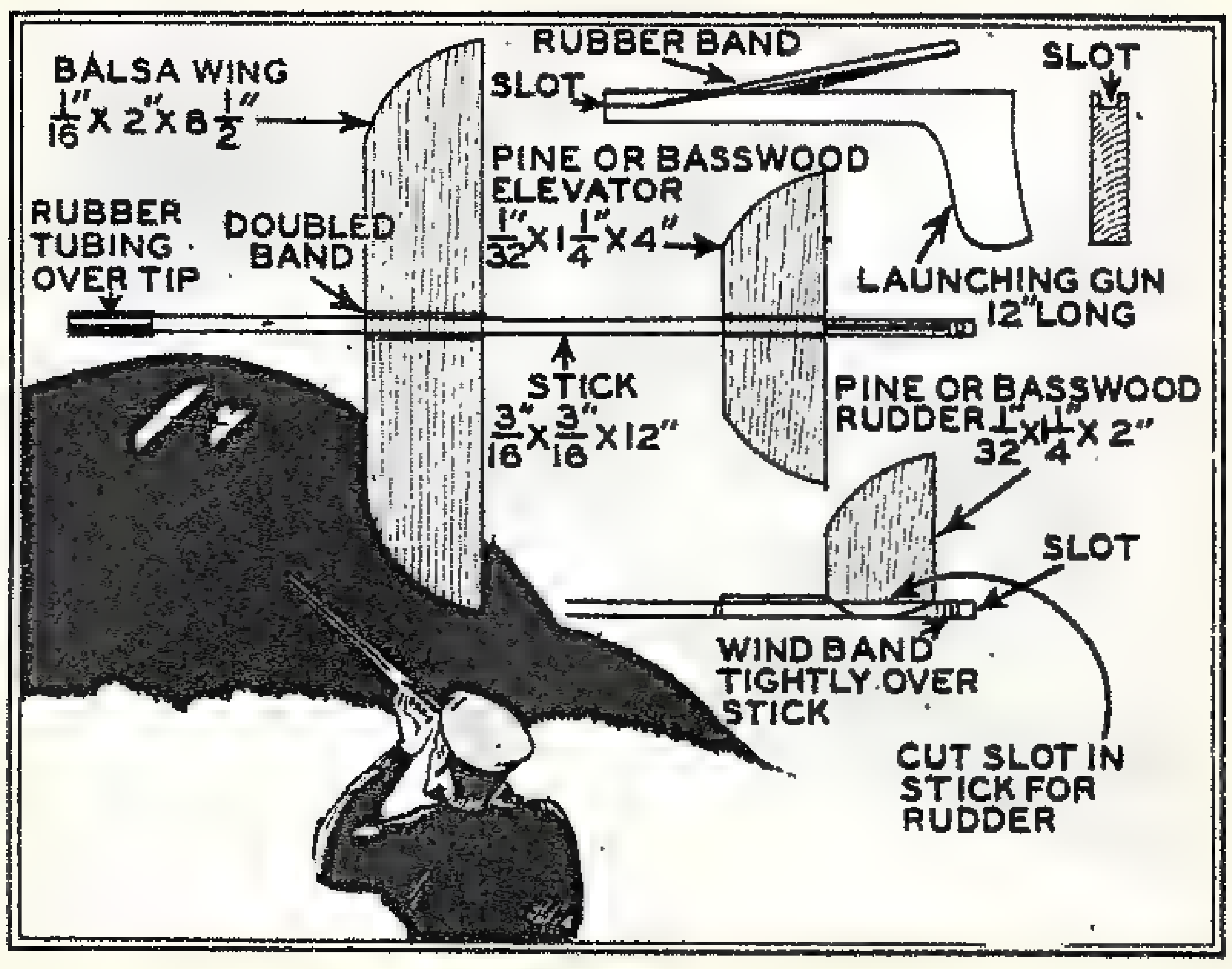

BOARD IS PLACED ON STOVE - GAS, KEROSENE OR GASOLINE - AND KEPT MOVING UNTIL THE SURFACE IS WELL CHARRED
CHARRED PANEL VIGOROUSLY BRUSHED WITH STIFF WIRE BRUSH
FINISHED GRAINING

Home workshop projects can be attractively finished with a Japanese "Sugi" effect by charring the surface of the wood over a stove then scraping off charred portion with wire brush.

Gun Catapults Toy Planes

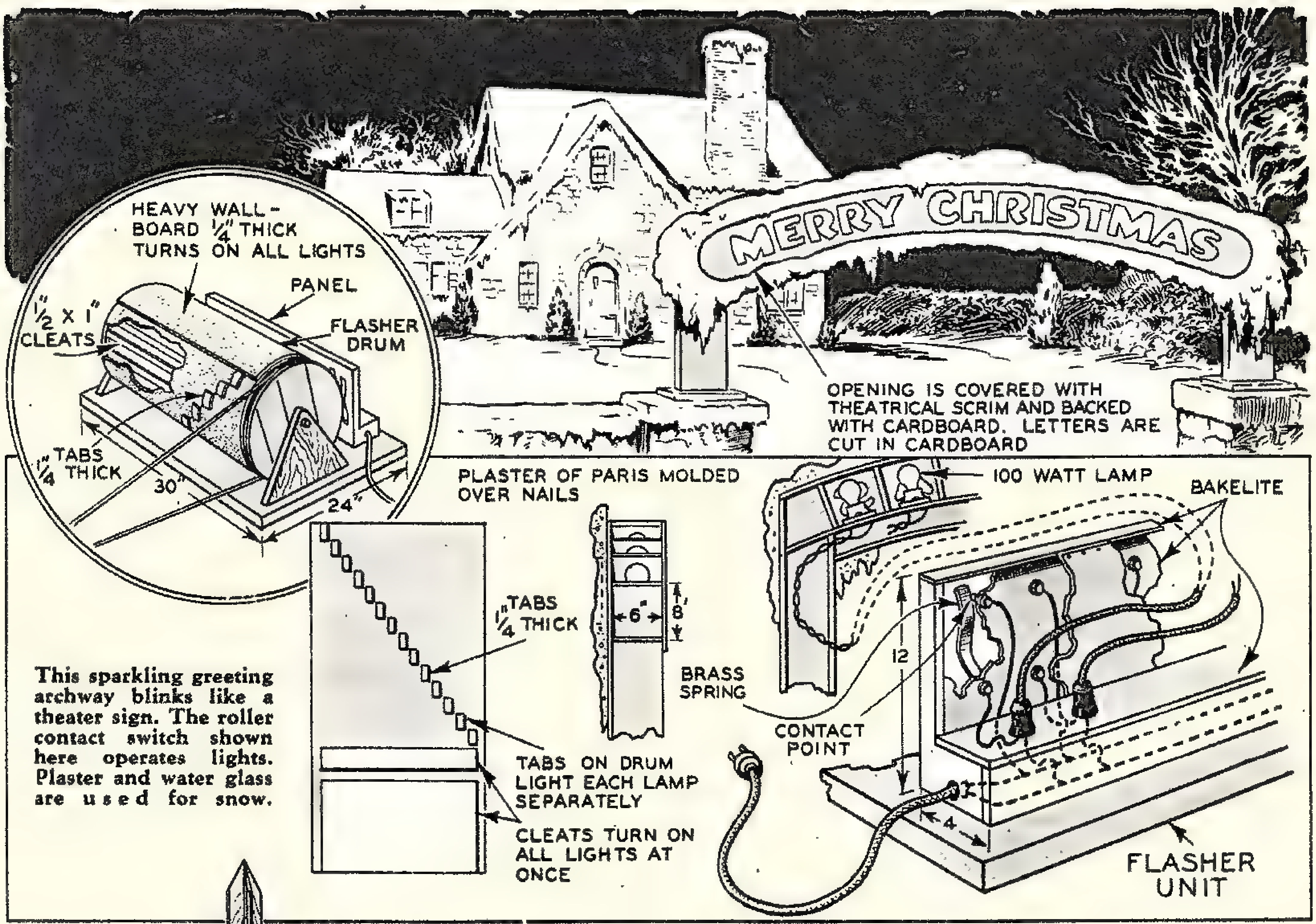
SHOOTING miniature glider planes into the air with a sling-shot pistol is great fun especially if a dozen planes are constructed and fired into the air in rapid succession. The planes are simple to construct since they consist of just four pieces of balsa wood, the rudder, the stick, wing and elevator. The wing structure is $\frac{1}{16}$-inch balsa as are rudder and elevator. The stick is cut from a one-foot length of $\frac{3}{16}$ by $\frac{3}{16}$-inch and notched at one end to allow for the insertion of the rudder. The wings are fastened to the stick with rubber bands. Adjust the wing position until the glider sails in an even flight.

The pistol is cut from a piece of white pine or similar stock and slotted at one end to take a rubber band for catapulting the glider. A groove in the top of the gun permits the stick to slide freely in it. To shoot the planes place the stick in the groove, hook the rubber band over the rudder end of the stick and pull back.


BALSA WING $\frac{1}{16}$"X 2"X 8$\frac{1}{2}$"
RUBBER BAND
SLOT
SLOT
PINE OR BASSWOOD ELEVATOR $\frac{1}{32}$"X 1$\frac{1}{4}$"X 4"
RUBBER TUBING OVER TIP
DOUBLED BAND
LAUNCHING GUN 12" LONG
STICK $\frac{3}{16}$"X$\frac{3}{16}$"X 12"
PINE OR BASSWOOD RUDDER $\frac{1}{32}$"X 1$\frac{1}{4}$"X 2"
SLOT
WIND BAND TIGHTLY OVER STICK
CUT SLOT IN STICK FOR RUDDER

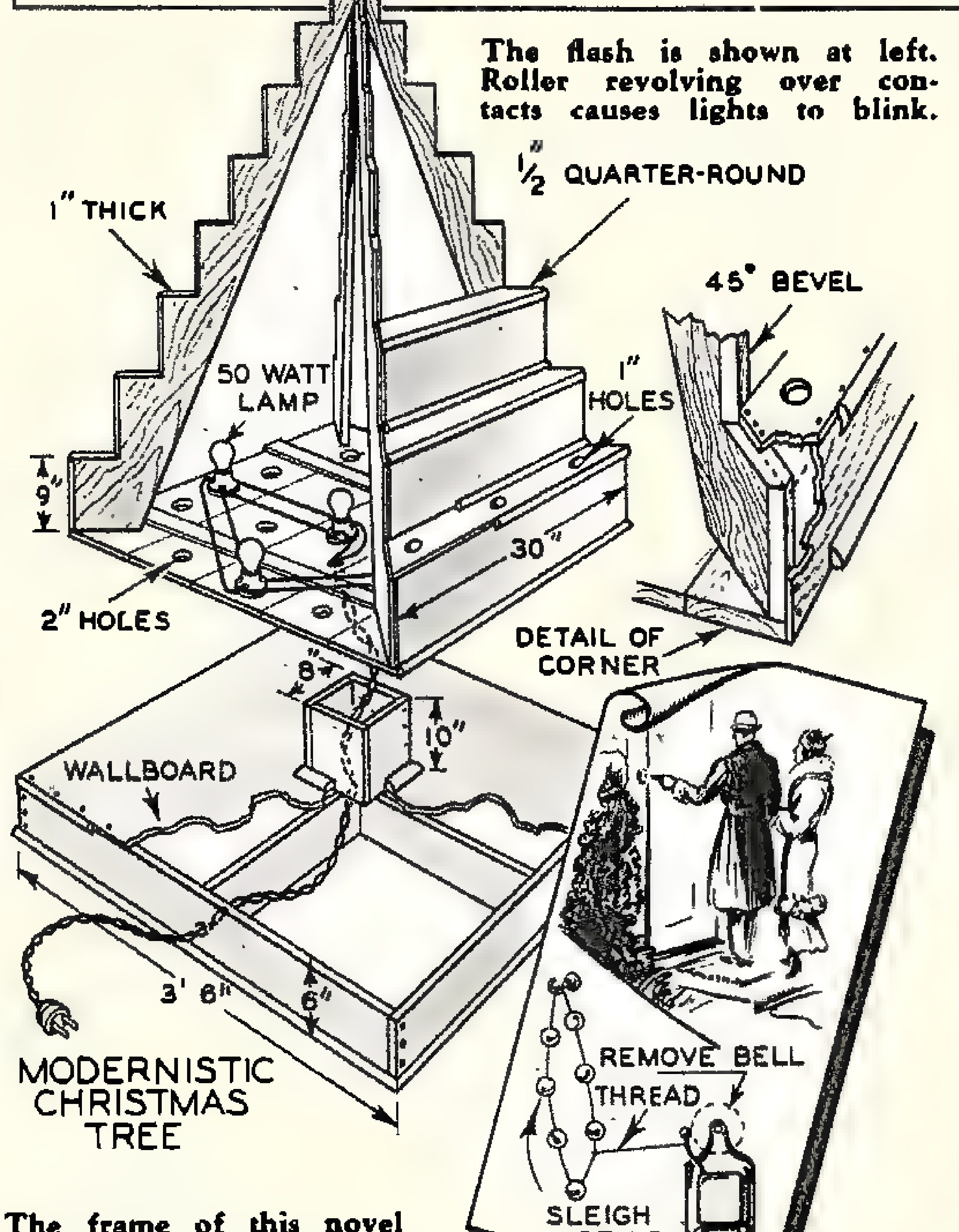
Balsa glider planes like the one shown here loop and zoom through the air for several minutes. A sling-shot pistol, carved from soft wood, launches planes. Rubber bands hold wings.

EXTEND HOLIDAY GREETINGS


MERRY CHRISTMAS
HEAVY WALL-BOARD 1/4" THICK TURNS ON ALL LIGHTS
PANEL
1/2 x 1" CLEATS
FLASHER DRUM
TABS 1/4" THICK
30"
24"
OPENING IS COVERED WITH THEATRICAL SCRIM AND BACKED WITH CARDBOARD. LETTERS ARE CUT IN CARDBOARD
PLASTER OF PARIS MOLDED OVER NAILS
100 WATT LAMP
BAKELITE
TABS 1/4" THICK
6"
8"
BRASS SPRING
12
CONTACT POINT
TABS ON DRUM LIGHT EACH LAMP SEPARATELY
CLEATS TURN ON ALL LIGHTS AT ONCE
4
FLASHER UNIT

This sparkling greeting archway blinks like a theater sign. The roller contact switch shown here operates lights. Plaster and water glass are used for snow.

The flash is shown at left. Roller revolving over contacts causes lights to blink.


1" THICK
1/2" QUARTER-ROUND
45° BEVEL
50 WATT LAMP
1" HOLES
9"
30"
2" HOLES
DETAIL OF CORNER
8"
10"
WALLBOARD
3' 6"
6"
MODERNISTIC CHRISTMAS TREE
REMOVE BELL
THREAD
SLEIGH BELLS

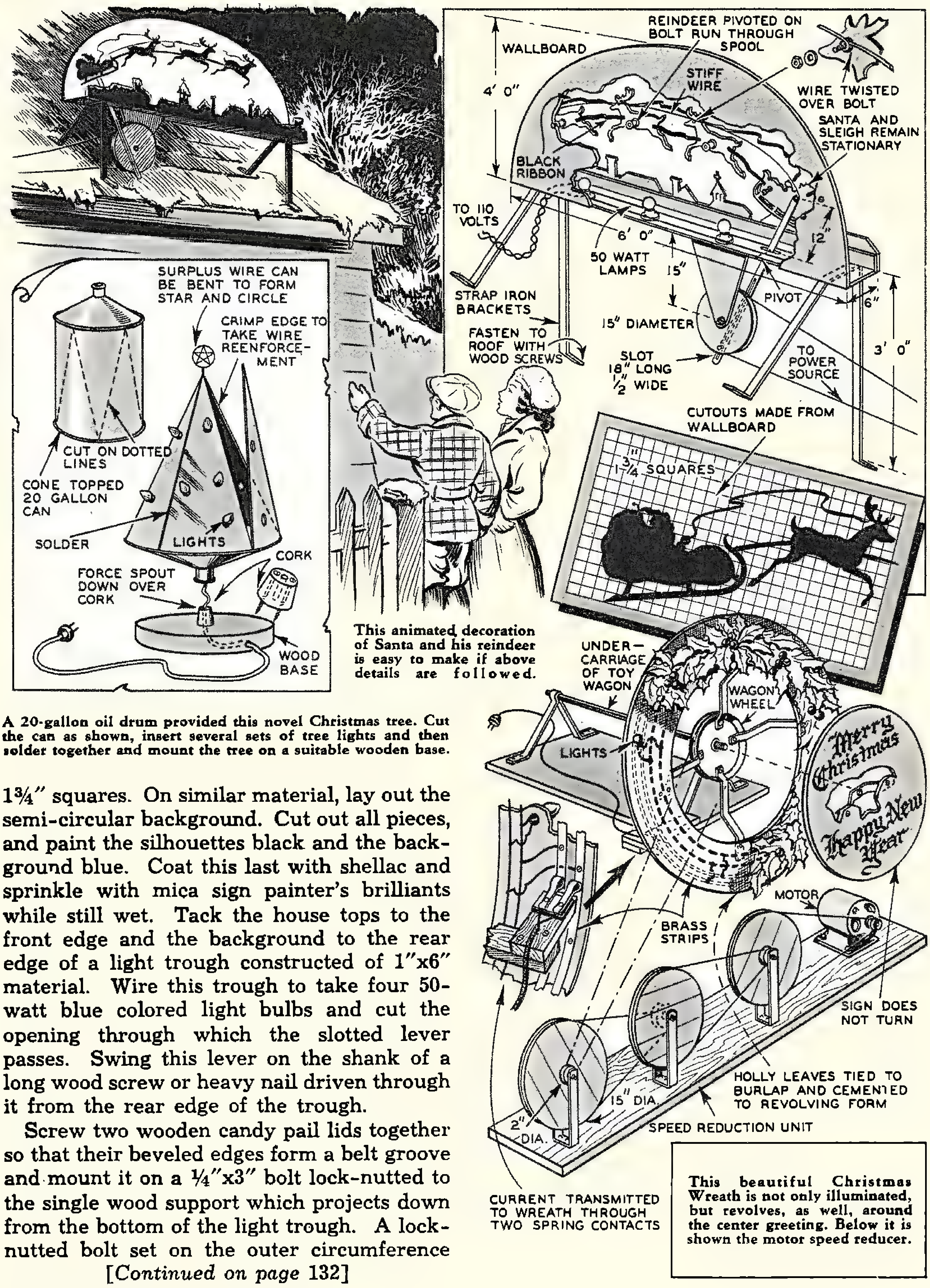
The frame of this novel Christmas tree is of wood, painted in bright enamel with Cellophane covering.

by David A. Brown

IN THE creation of novel Christmas decorations for the home, amateur craftsmen will encounter many interesting tests of skill and ingenuity. Carpentry, electricity and metal working all play a part in the adapting of the traditional symbols of the season to modern ideas of design and utility, and the workshop enthusiast who directs his attentions toward such a seasonable project is certain to enjoy many hours of entertaining work; his home will reflect the spirit of the occasion; and he will have the satisfaction of knowing that he has done much to preserve the beautiful customs long associated with this ancient holiday.

By combining light and shadow with motion, an unusual house top decoration may be contrived from the time honored Santa and reindeers. Cover the accompanying illustration with a sheet of tracing paper ruled into 1/8" squares and, with the intersecting lines as guides, transfer the figures to a 4'x6' piece of wall board which has been marked off into

WITH OUTDOOR DECORATIONS


REINDEER PIVOTED ON BOLT RUN THROUGH SPOOL
WALLBOARD
4' 0"
STIFF WIRE
WIRE TWISTED OVER BOLT
SANTA AND SLEIGH REMAIN STATIONARY
BLACK RIBBON
TO 110 VOLTS
6' 0"
50 WATT LAMPS
15"
12"
STRAP IRON BRACKETS
PIVOT
6"
15" DIAMETER
FASTEN TO ROOF WITH WOOD SCREWS
SLOT 18" LONG 1/2" WIDE
TO POWER SOURCE
3' 0"
CUTOUTS MADE FROM WALLBOARD
1 3/4" SQUARES
SURPLUS WIRE CAN BE BENT TO FORM STAR AND CIRCLE
CRIMP EDGE TO TAKE WIRE REENFORCEMENT
CUT ON DOTTED LINES
CONE TOPPED 20 GALLON CAN
SOLDER
LIGHTS
CORK
FORCE SPOUT DOWN OVER CORK
WOOD BASE
UNDER-CARRIAGE OF TOY WAGON
WAGON WHEEL
LIGHTS
Merry Christmas
Happy New Year
MOTOR
BRASS STRIPS
SIGN DOES NOT TURN
HOLLY LEAVES TIED TO BURLAP AND CEMENTED TO REVOLVING FORM
15" DIA.
2" DIA.
SPEED REDUCTION UNIT
CURRENT TRANSMITTED TO WREATH THROUGH TWO SPRING CONTACTS

This animated decoration of Santa and his reindeer is easy to make if above details are followed.

A 20-gallon oil drum provided this novel Christmas tree. Cut the can as shown, insert several sets of tree lights and then solder together and mount the tree on a suitable wooden base.

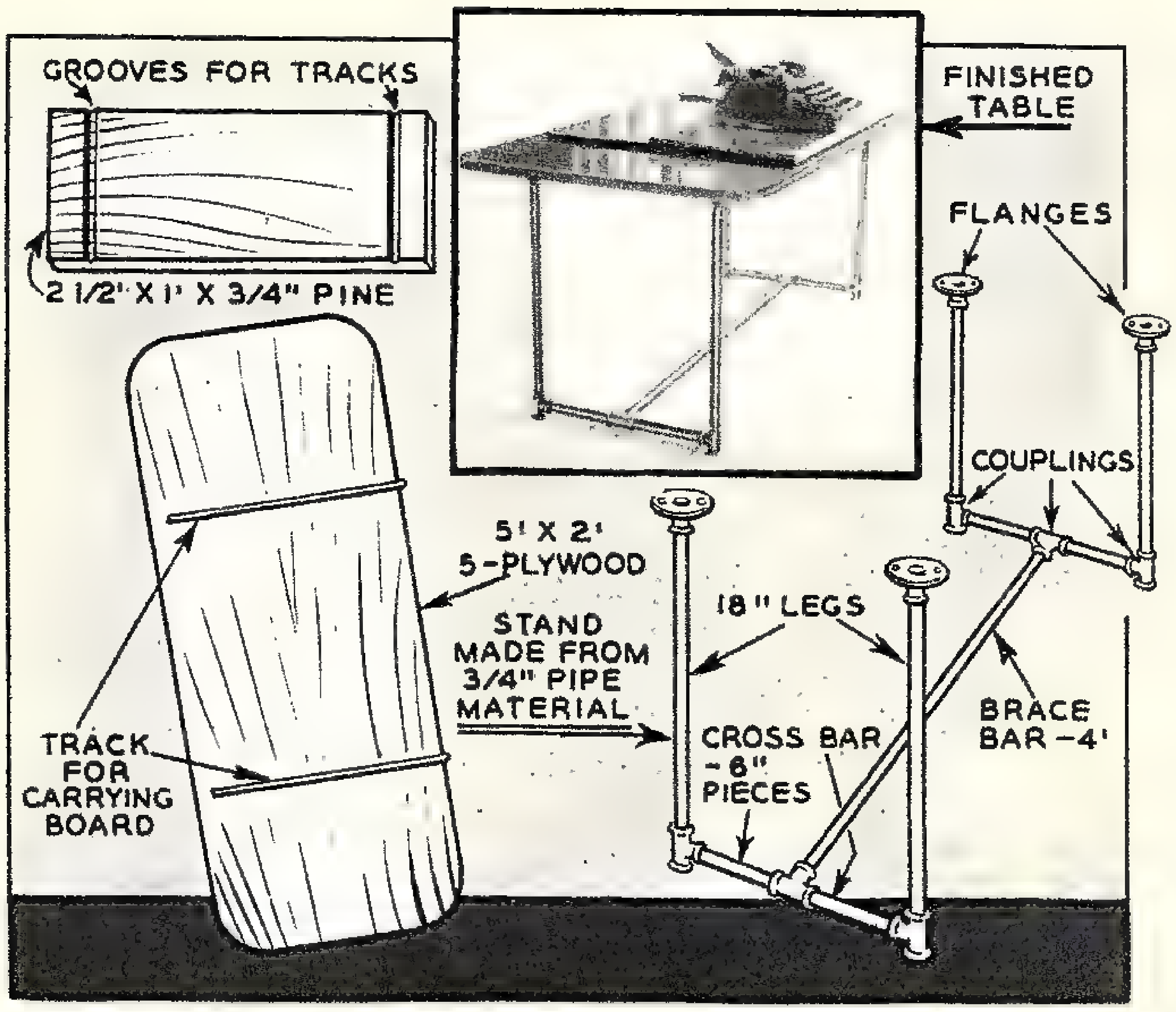
This beautiful Christmas Wreath is not only illuminated, but revolves, as well, around the center greeting. Below it is shown the motor speed reducer.

1¾" squares. On similar material, lay out the semi-circular background. Cut out all pieces, and paint the silhouettes black and the background blue. Coat this last with shellac and sprinkle with mica sign painter's brilliants while still wet. Tack the house tops to the front edge and the background to the rear edge of a light trough constructed of 1"x6" material. Wire this trough to take four 50-watt blue colored light bulbs and cut the opening through which the slotted lever passes. Swing this lever on the shank of a long wood screw or heavy nail driven through it from the rear edge of the trough.

Screw two wooden candy pail lids together so that their beveled edges form a belt groove and mount it on a ¼"x3" bolt lock-nutted to the single wood support which projects down from the bottom of the light trough. A lock-nutted bolt set on the outer circumference

[*Continued on page* 132]

PIPE FITTINGS FORM MODERN DESK


GROOVES FOR TRACKS
2 1/2' X 1' X 3/4" PINE
FINISHED TABLE
FLANGES
COUPLINGS
5' X 2' 5-PLYWOOD
18" LEGS
STAND MADE FROM 3/4" PIPE MATERIAL
TRACK FOR CARRYING BOARD
CROSS BAR -6" PIECES
BRACE BAR -4'

Fashioned from lengths of scrap pipe this modern typewriter desk features a sliding typewriter platform so that the machine can be pushed out of the way when not in use. The top is cut from a panel of five-ply veneer.

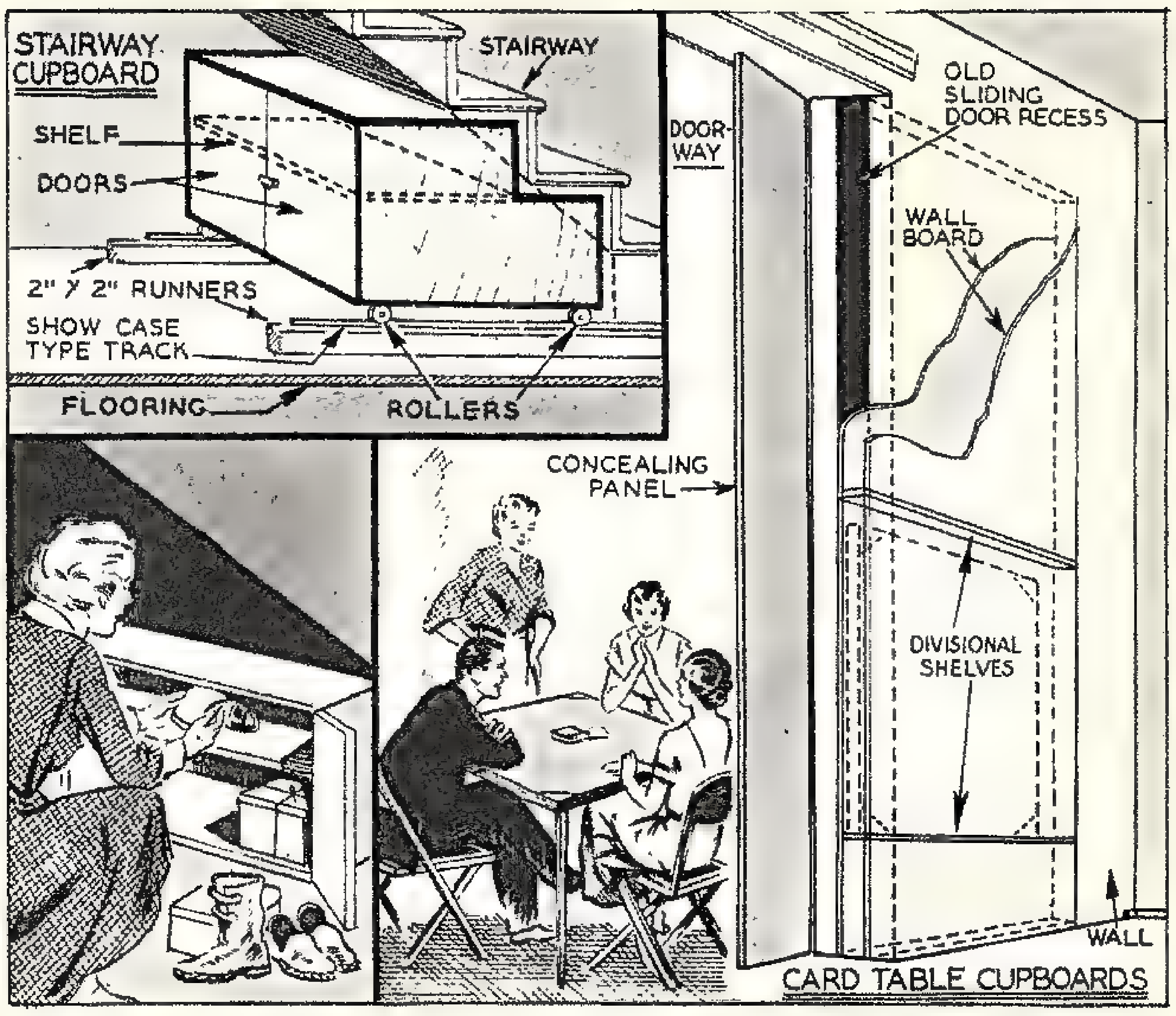
A TYPEWRITER desk styled after the modern trend can be assembled in a few hours from a few lengths of scrap pipe cut down, threaded and joined with the necessary fittings then attached to a plywood top. A unique feature of this desk is the sliding typewriter platform which permits the machine to be pushed to the rear of the desk when not in use.

Cut the pipe to the lengths indicated in the diagrams shown at the left and after assembling attach the top which is a 5-ply veneer panel measuring 2 by 5 feet. In the center of the desk top place a pair of showcase door tracks for the typewriter platform to roll on. The platform is cut from a piece of ¾-inch white pine and measures 2½ by 1 feet. Rollers are attached to the bottom of the platform to match the desk top tracks. The completed desk can be enameled in any modern contrast. Blue, green or red enamel may be used for the top with the metal frame in a silver finish. The typewriter platform is enameled in black. The typewriter is permanently left on the platform.

Utilizing Home's Odd Corners

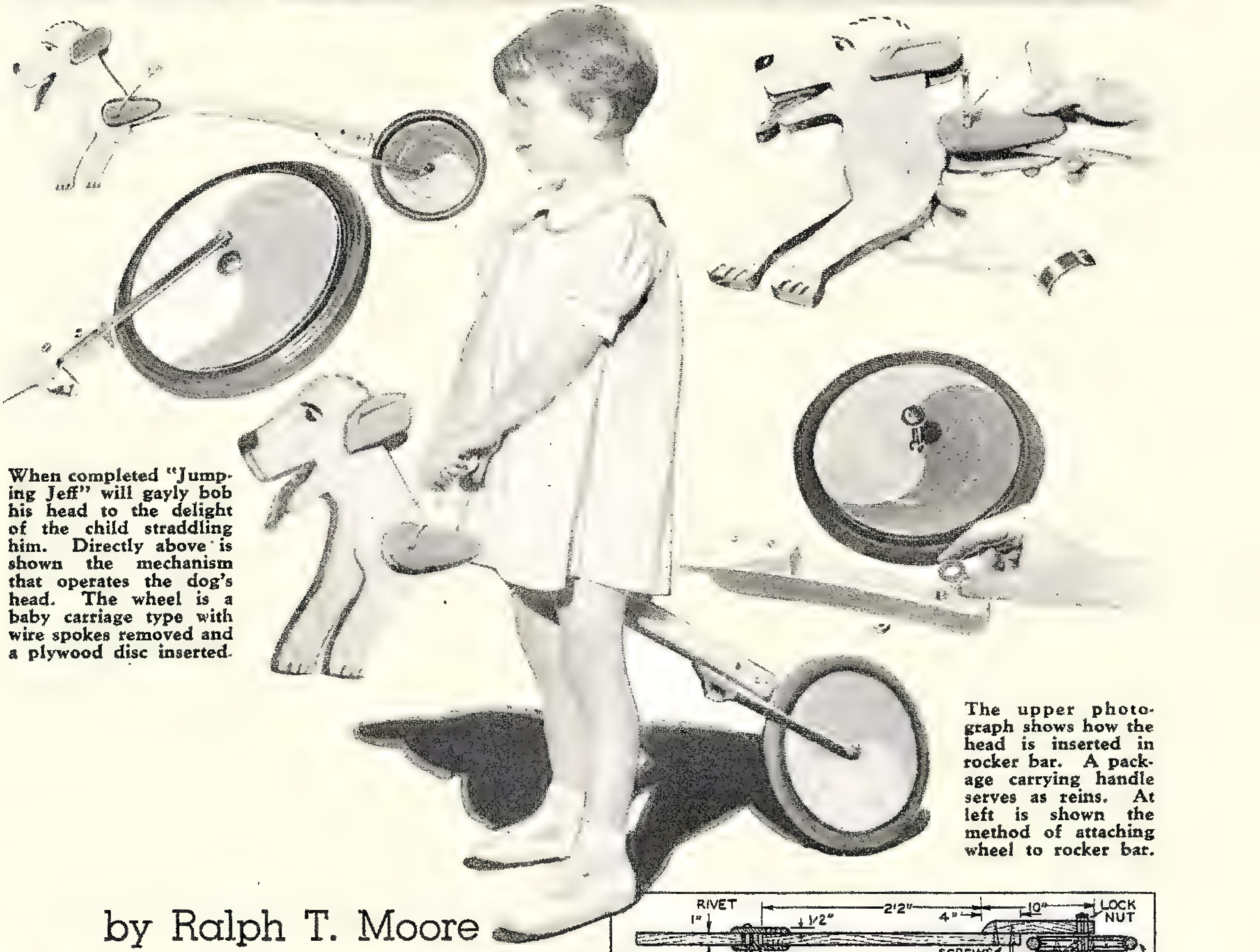
IN NEARLY every home, both new and old, there are many nooks and corners that can be converted with a little work into valuable storage space. Take for example a home that at one time had been fitted with sliding doors, but which since have been removed to abide with the changing times. A door constructed of wallboard to fit the sliding door recess can be fitted with shelves so that two card tables can be stored in them with sufficient space left at the bottom for several umbrellas, canes or other long compact articles.

The space just under the stairs landing is also valuable storage space and by constructing a suitable closet or cupboard many small articles can be conveniently stored away when not being used. The cupboard should follow the construction of the stairs and be provided with rollers so that it can be pushed out of the way after articles have been deposited in it. The shelves make a convenient place for junior's toys.


STAIRWAY CUPBOARD
STAIRWAY
SHELF
DOORS
2" X 2" RUNNERS
SHOW CASE TYPE TRACK
FLOORING
ROLLERS
DOOR-WAY
OLD SLIDING DOOR RECESS
WALL BOARD
CONCEALING PANEL
DIVISIONAL SHELVES
WALL
CARD TABLE CUPBOARDS

Odd corners about the home can be converted, as shown here, into valuable closet space. A hollow wallboard door inserted in a sliding door recess makes a handy card table closet. Space under stairs can be utilized, too.

"Jumping Jeff"—A Tiny Tot's Toy



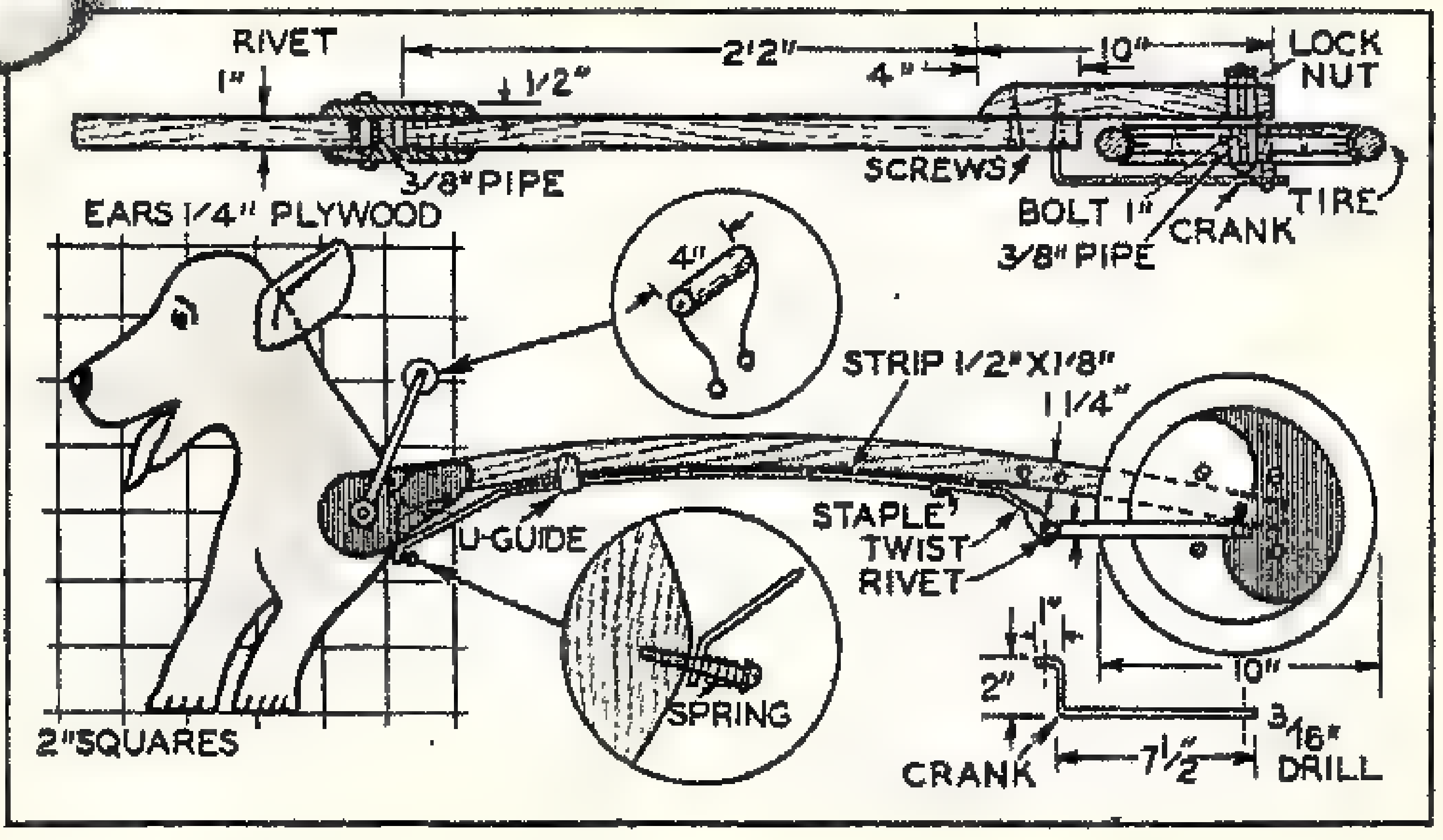
When completed "Jumping Jeff" will gayly bob his head to the delight of the child straddling him. Directly above is shown the mechanism that operates the dog's head. The wheel is a baby carriage type with wire spokes removed and a plywood disc inserted.

The upper photograph shows how the head is inserted in rocker bar. A package carrying handle serves as reins. At left is shown the method of attaching wheel to rocker bar.

by Ralph T. Moore

A FAR cry from the "straddled broomstick" and certainly more interesting is "Jumping Jeff," a pup who nods his head back and forth when ridden. Children like colorful animal toys and an animated one like this is an added delight.

The pup is simplicity itself to construct and the material requirements are commonplace. First lay out the head on a piece of wood 14"x9"x⅞" and saw out on a jig saw. From ¼" plywood cut out the ears and nail and glue them in place as shown in the accompanying diagrams. The stem piece is laid out on a piece of wood 30"x4"x⅞", the curved shape is marked out by means of a thin strip of wood. The stem width is 1¼" and for this an old chair rocker serves admirably. Cut a straight piece 10"x⅞"x1¾" and fasten it with wood screws as shown to the curved piece. Drill the head piece and the stem with a ⅝" drill and into these holes drive a ⅞" length of ⅜" pipe to serve as bearings. Next cut two side hinge pieces from plywood 5"x2½"x ⅜" and drill these as shown. Nail and glue these to the end of the curved stem. Drill a 4" length of ⅞" dowel through the center with a $\frac{3}{16}$" drill and insert a 16" length of No. 10 iron wire. Bend this as diagram indicates and form eyes in the ends with pliers.



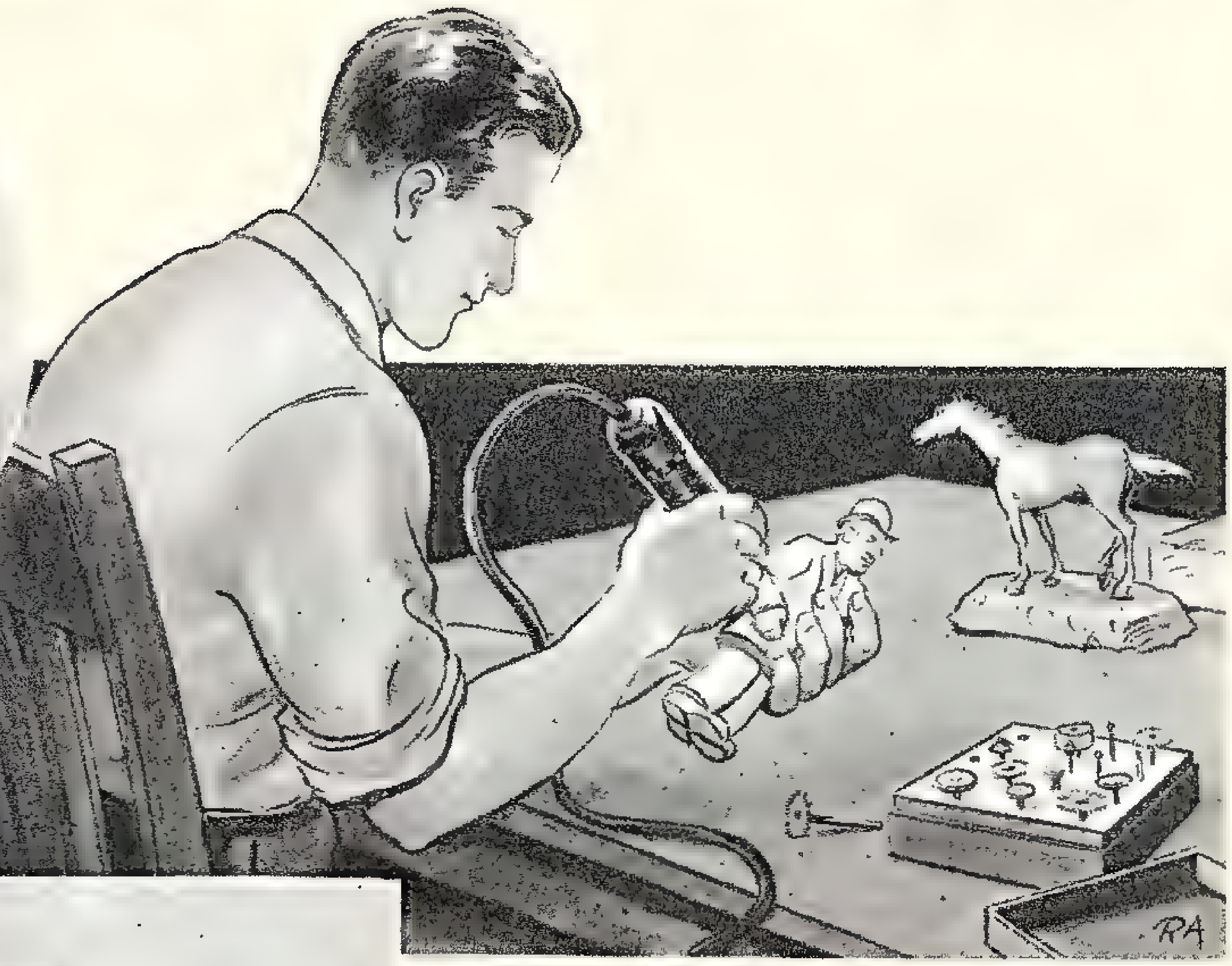
Construct "Jumping Jeff" according to specifications shown here. Dog's head is copied according to pattern pictured above. Tongue and ears are cut from plywood and nailed in place.

Obtain an old rubber tired carriage wheel

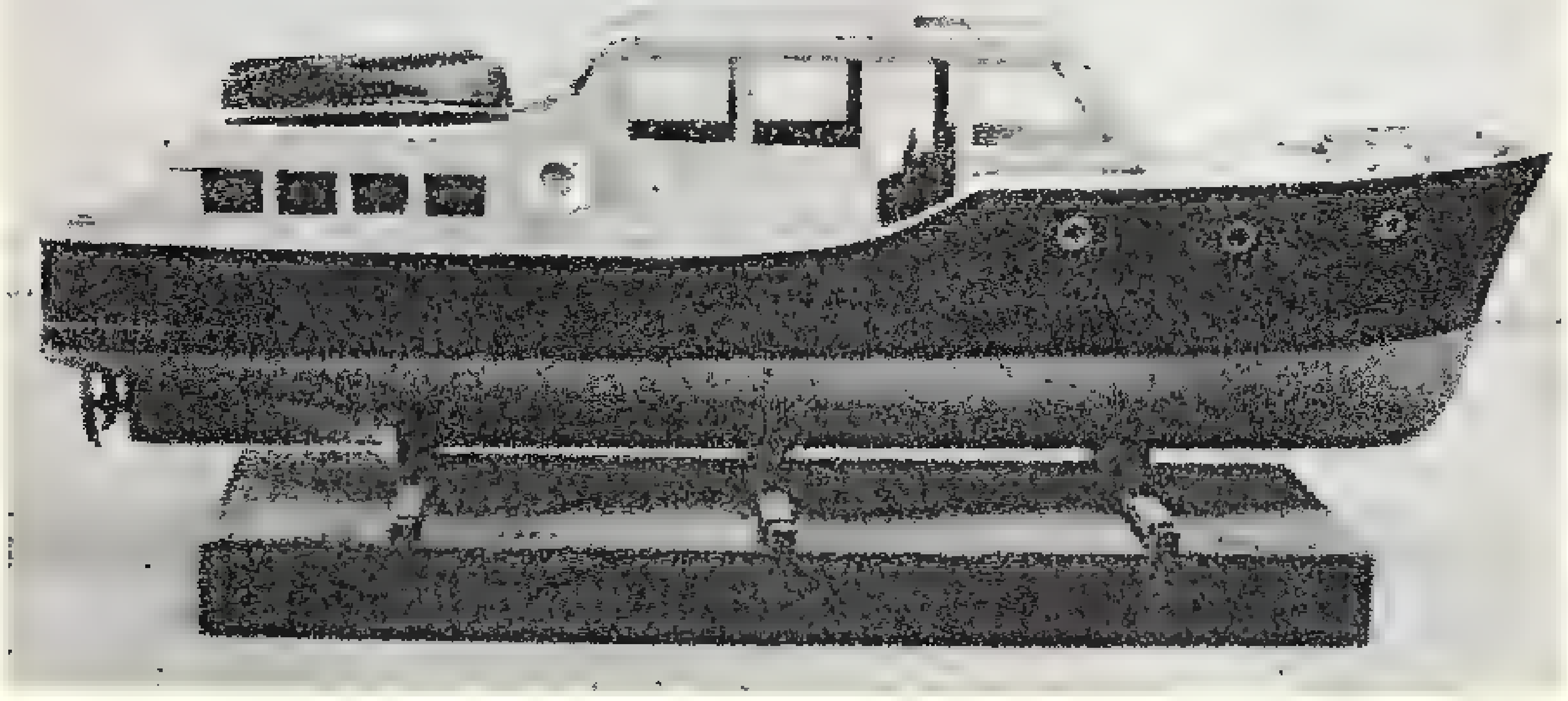
[*Continued on page* 126]

TINY HAND POWER GRINDERS

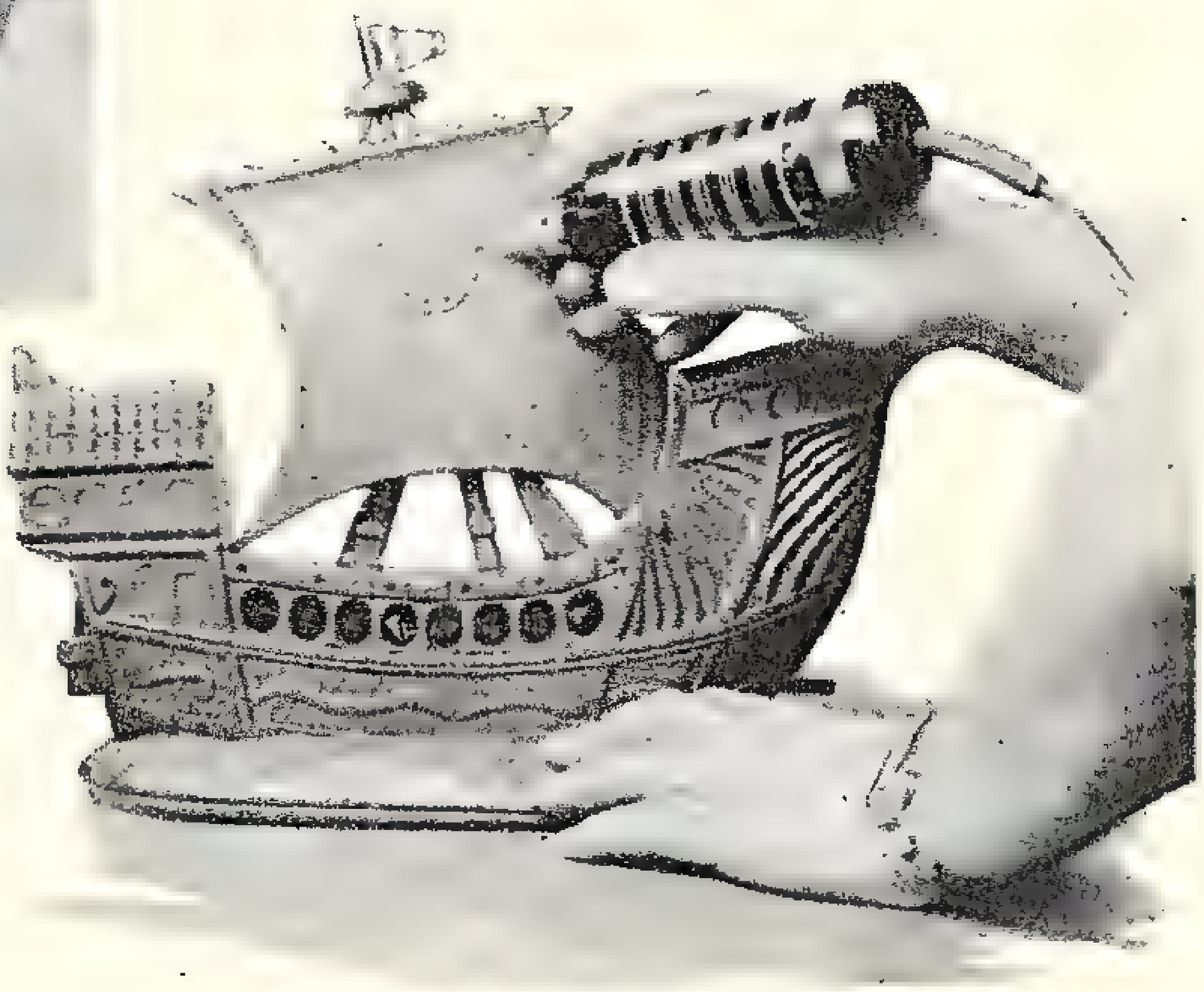
This model ship is just one of the many interesting projects that can be fashioned to exacting specifications by using a hand grinder for carving.



Interesting caricatures such as this one are easily carved from solid or laminated blocks of wood. The hand power grinder is provided with a chuck for taking numerous cutting, drilling and sanding tools.



Though it has all the marking of the professional modelmaker the miniature craft shown above was made by an amateur model fan. Some details and sanding were done by grinder.



This attractive ship lamp nearing the final stages of completion was carved from a block of walnut. The tiny decorative designs are being applied to the sail with a finishing bur tool.

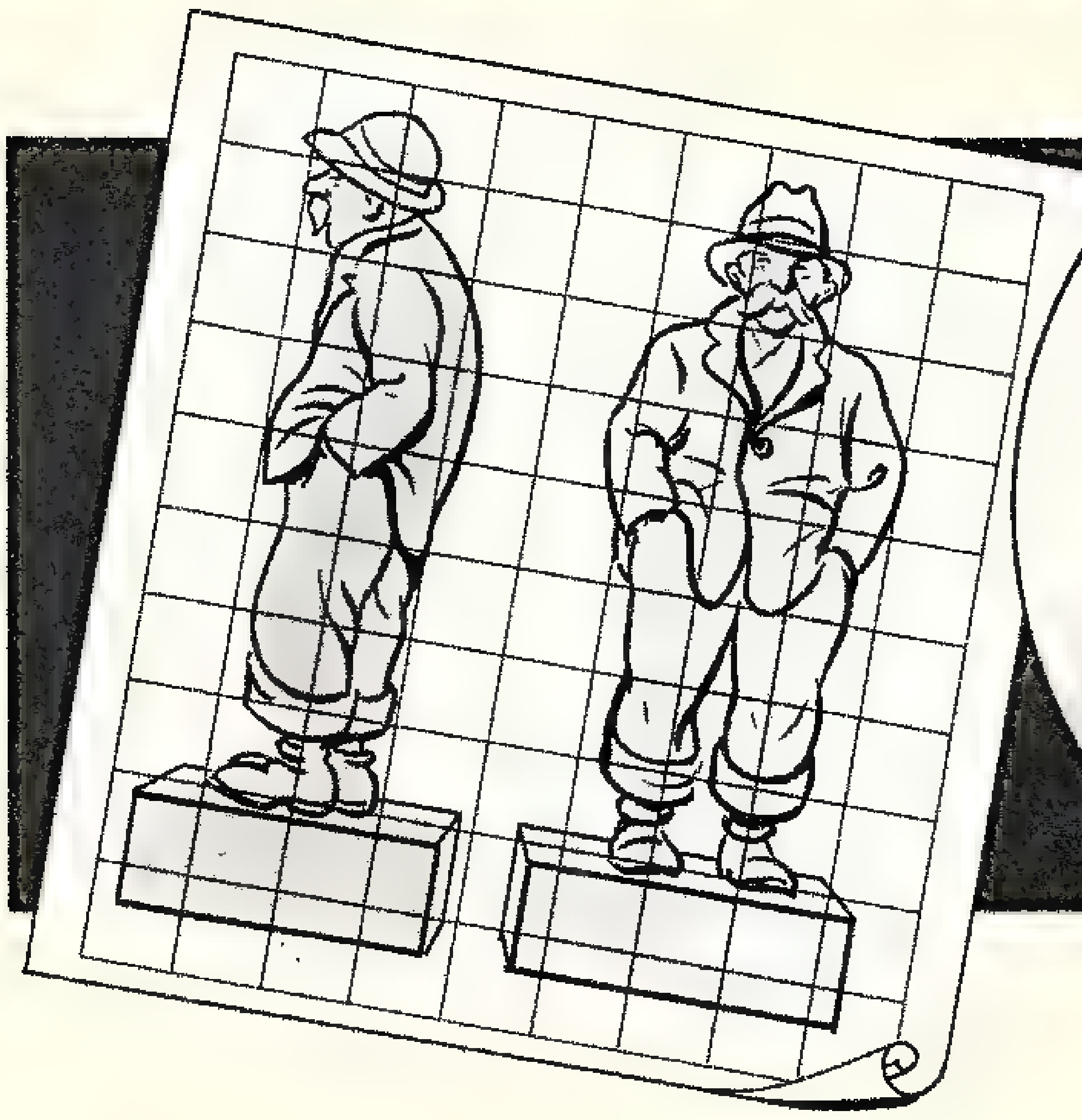
by A. T. Dalton

TO THE man who has a small workshop and limited room at his disposal yet who has a reasonable knowledge of wood-working and desire for carving there should be a very definite appeal in the new light weight portable high speed electric tools which allow a limitless variation of carving on wood, stone, cast resins and other material of this character.

These high speed, light weight, electrically driven tools are conveniently shaped to fit the hand and owing to their perfect balance can be used over long periods of time without danger of fatigue. The secret of their great usefulness for carving lies in their high speed. A large variety of especially developed steel cutters are used with the unit and leave smooth uniform cut and does not have to be finished by sanding or other means. This class of tool is, primarily, a finishing tool and thus lends itself to finishing work that has been roughed out.

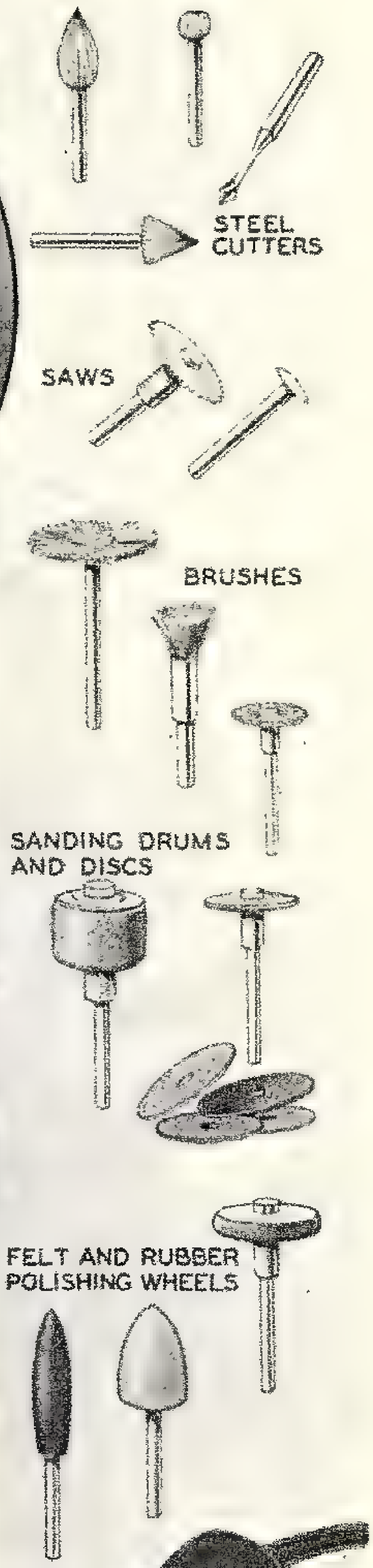
Another method most frequently used is to cut plywood to the appropriate figure desired and glue the plywood together to form a laminated block. For the craftsman who has not had previous experience in woodcarving it is suggested that the rough figure to be carved be cut from a solid block of wood by means of a hand saw.

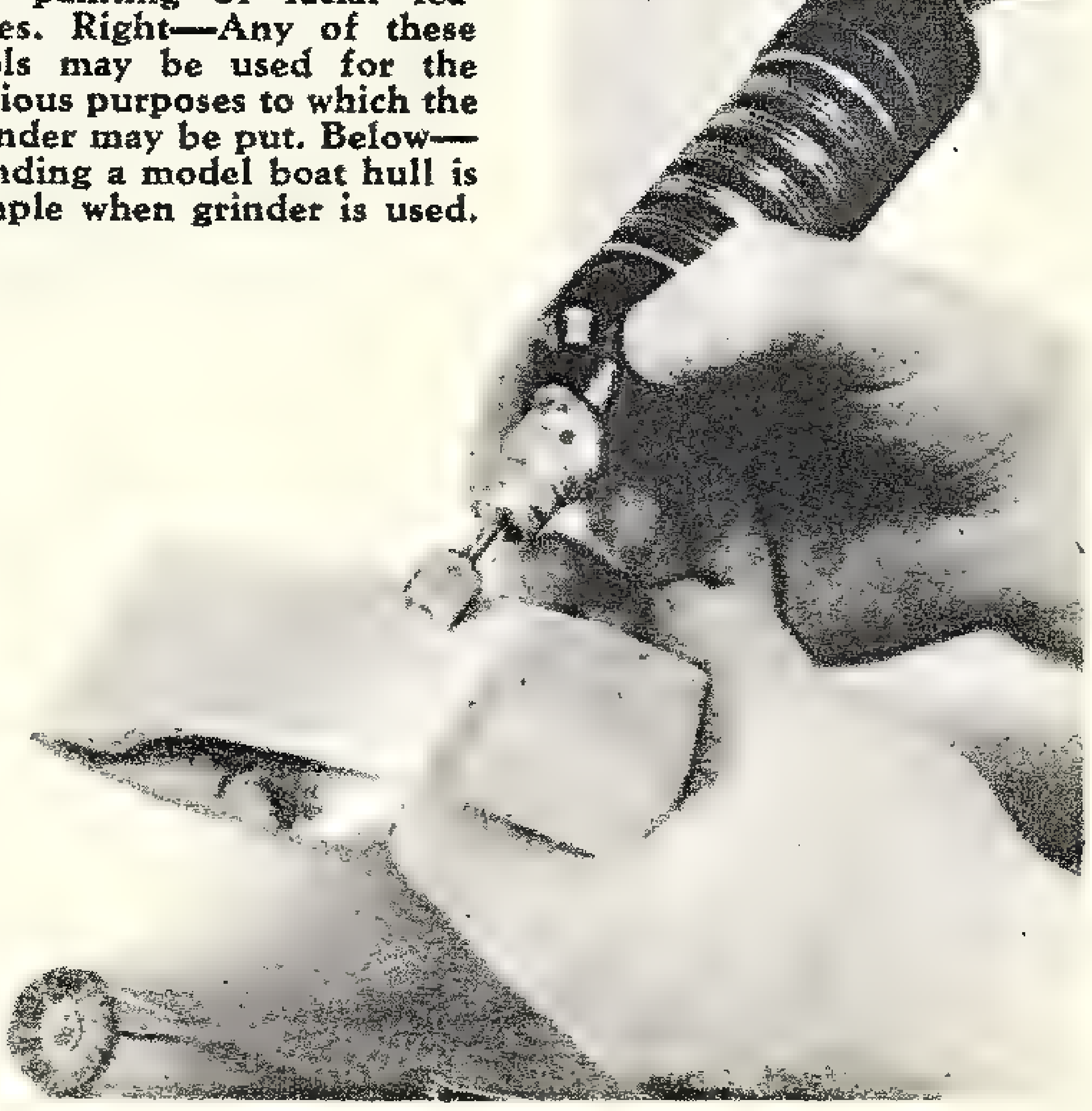
SIMPLIFY MODEL CARVING



Carving wood caricatures is not difficult provided the figure is sketched in front and profile views on the block of wood. Comic strip characters also are excellent subjects for carving and are easily made.

A plaque like the one shown here of Will Rogers can be carved by first tracing picture on a flat wood block.





Carved caricatures can be finished in a very attractive manner by painting them with colored india inks, water colors or lacquers. A few camel's hair brushes will simplify this work especially in the painting of facial features. Right—Any of these tools may be used for the various purposes to which the grinder may be put. Below—Sanding a model boat hull is simple when grinder is used.

The figure shown in the accompanying illustrations makes an interesting project relatively simple for the amateur craftsman who wishes to try his skill with these new type of hand tools. There are no excessive details such as hands or background with this figure. The squared diagram shows the front and side views. Transfer these profiles to their respective positions on the wood-block which has been built up from plywood or, if you prefer, solid block of wood. The design can then be cut out with band saw, jig saw or with a hand saw.

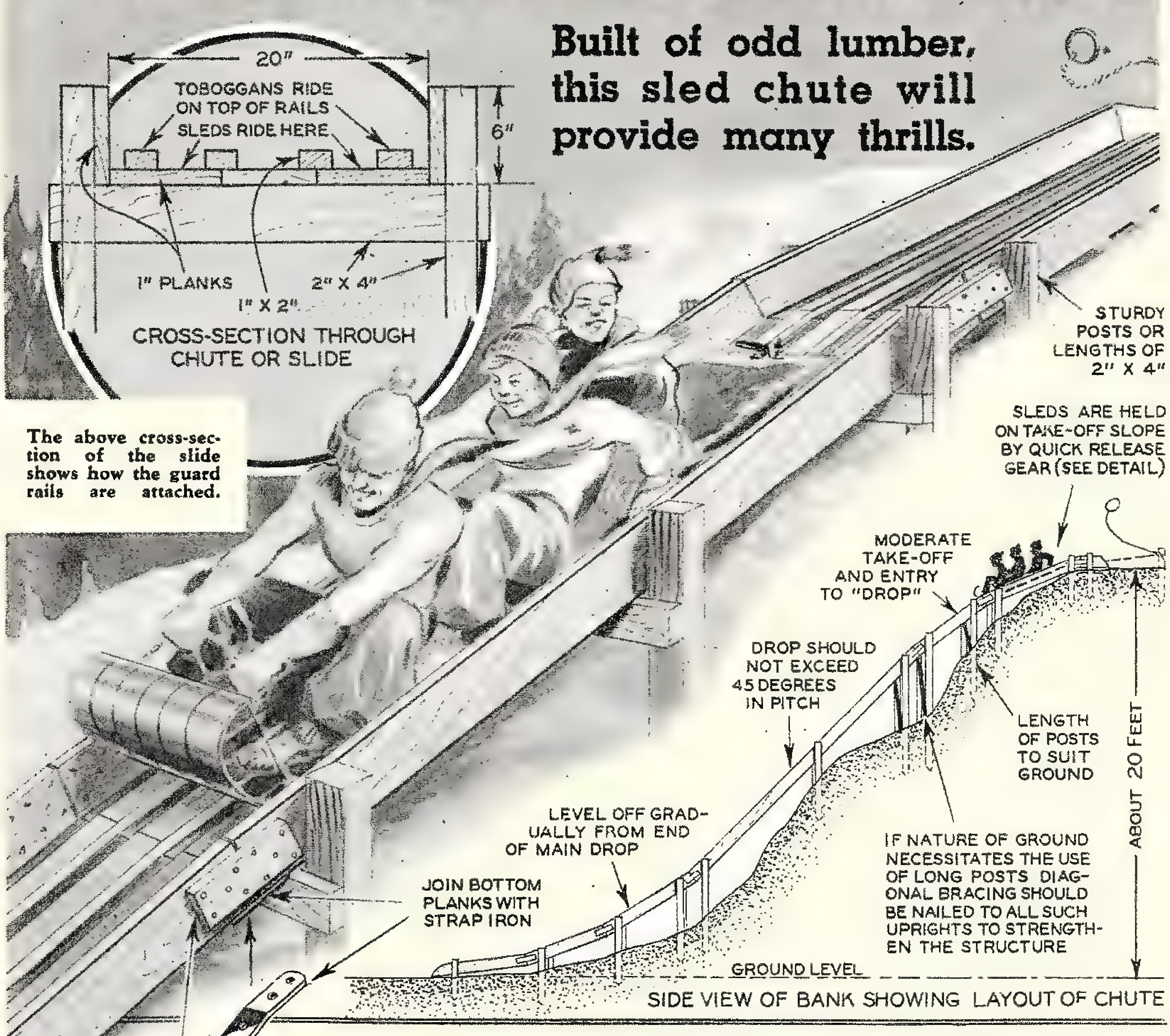
Using a rather large steel cutter rough out the design to the approximate figure following the outline given. Many craftsmen indicate the form that the model is to take by shading the design that has been drawn and transferred to the block. This often times serves as an excellent guide for bringing out different characteristics of the carving after it is actually underway.

It is difficult, and perhaps futile, to explain the step by step procedure to follow the modeling of the face for an example. With a design as simple as our first figure it is apparent that the cheeks, jaws and any portion of the fact are first cut with a relatively large steel cutter. Mustache, eyes, eye-brows and nose are formed with smaller steel cutters of the ball shape and flame shape, a large variety

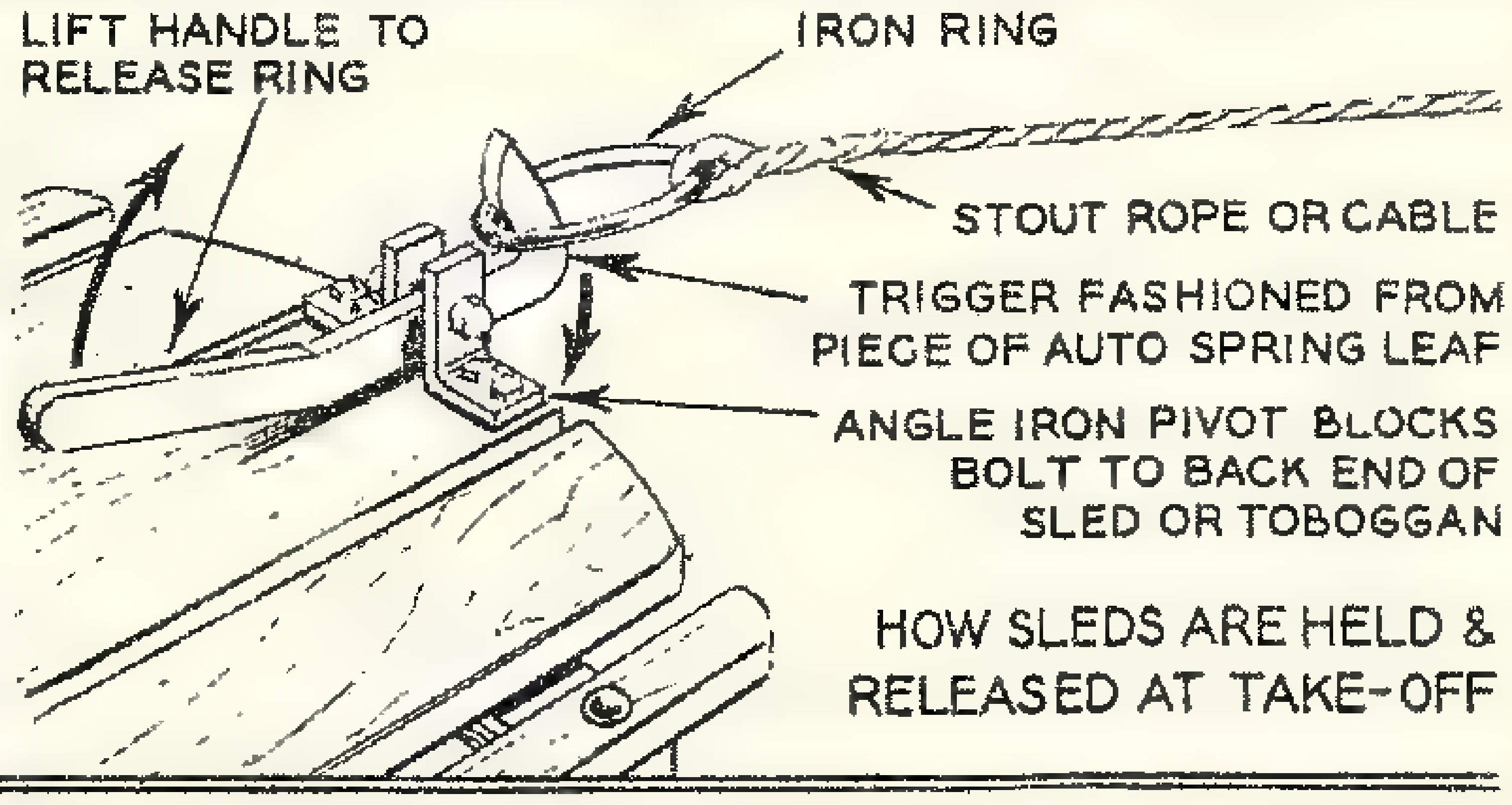
[*Continued on page* 124]

BUILD THRILLER TOBOGGAN SLIDE

Built of odd lumber, this sled chute will provide many thrills.

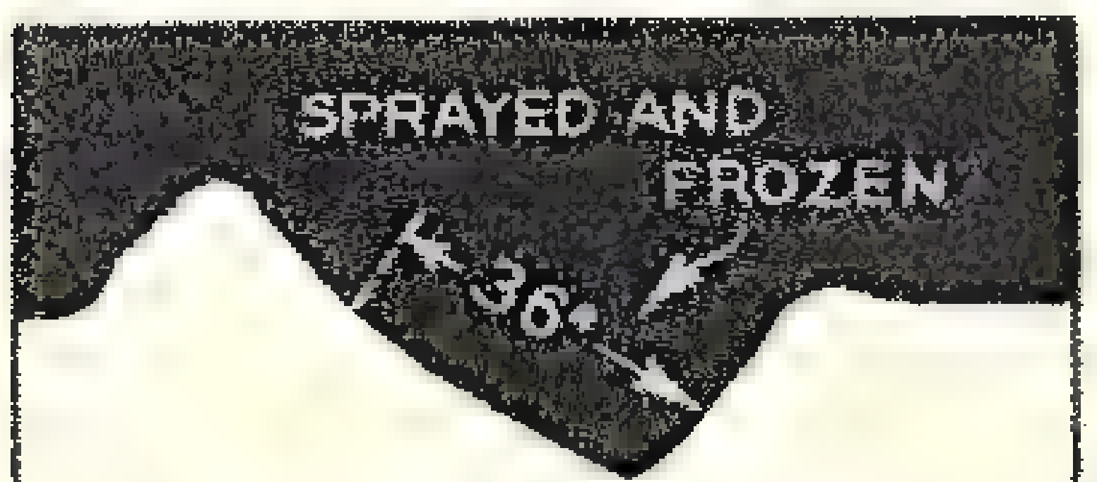

20"
TOBOGGANS RIDE ON TOP OF RAILS
SLEDS RIDE HERE
6"
1" PLANKS
2" X 4"
1" X 2"
CROSS-SECTION THROUGH CHUTE OR SLIDE
STURDY POSTS OR LENGTHS OF 2" X 4"
SLEDS ARE HELD ON TAKE-OFF SLOPE BY QUICK RELEASE GEAR (SEE DETAIL)
MODERATE TAKE-OFF AND ENTRY TO "DROP"
DROP SHOULD NOT EXCEED 45 DEGREES IN PITCH
LENGTH OF POSTS TO SUIT GROUND
ABOUT 20 FEET
LEVEL OFF GRADUALLY FROM END OF MAIN DROP
IF NATURE OF GROUND NECESSITATES THE USE OF LONG POSTS DIAGONAL BRACING SHOULD BE NAILED TO ALL SUCH UPRIGHTS TO STRENGTHEN THE STRUCTURE
JOIN BOTTOM PLANKS WITH STRAP IRON
GROUND LEVEL
SIDE VIEW OF BANK SHOWING LAYOUT OF CHUTE
JOIN SIDES WITH CLEATS OR FISHPLATES NAILED AND CLINCHED

The above cross-section of the slide shows how the guard rails are attached.

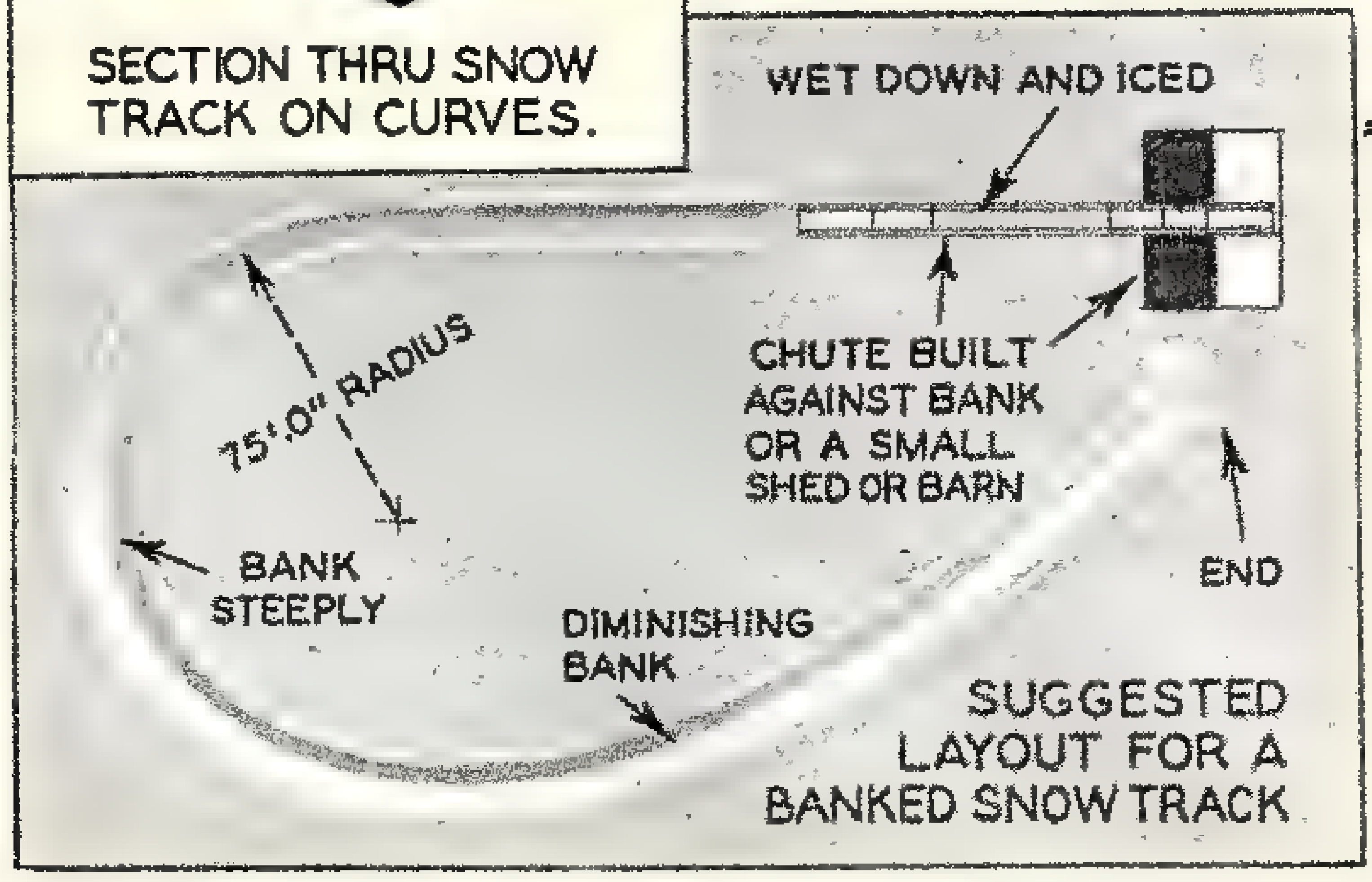

LIFT HANDLE TO RELEASE RING
IRON RING
STOUT ROPE OR CABLE
TRIGGER FASHIONED FROM PIECE OF AUTO SPRING LEAF
ANGLE IRON PIVOT BLOCKS BOLT TO BACK END OF SLED OR TOBOGGAN

HOW SLEDS ARE HELD & RELEASED AT TAKE-OFF

Turns should be banked with snow to approximately the angle shown at left. The release mechanism, at right, is simply a hook and iron ring. The hook is provided with a lever so that sled can be released after riders are seated.


SPRAYED AND FROZEN
36°

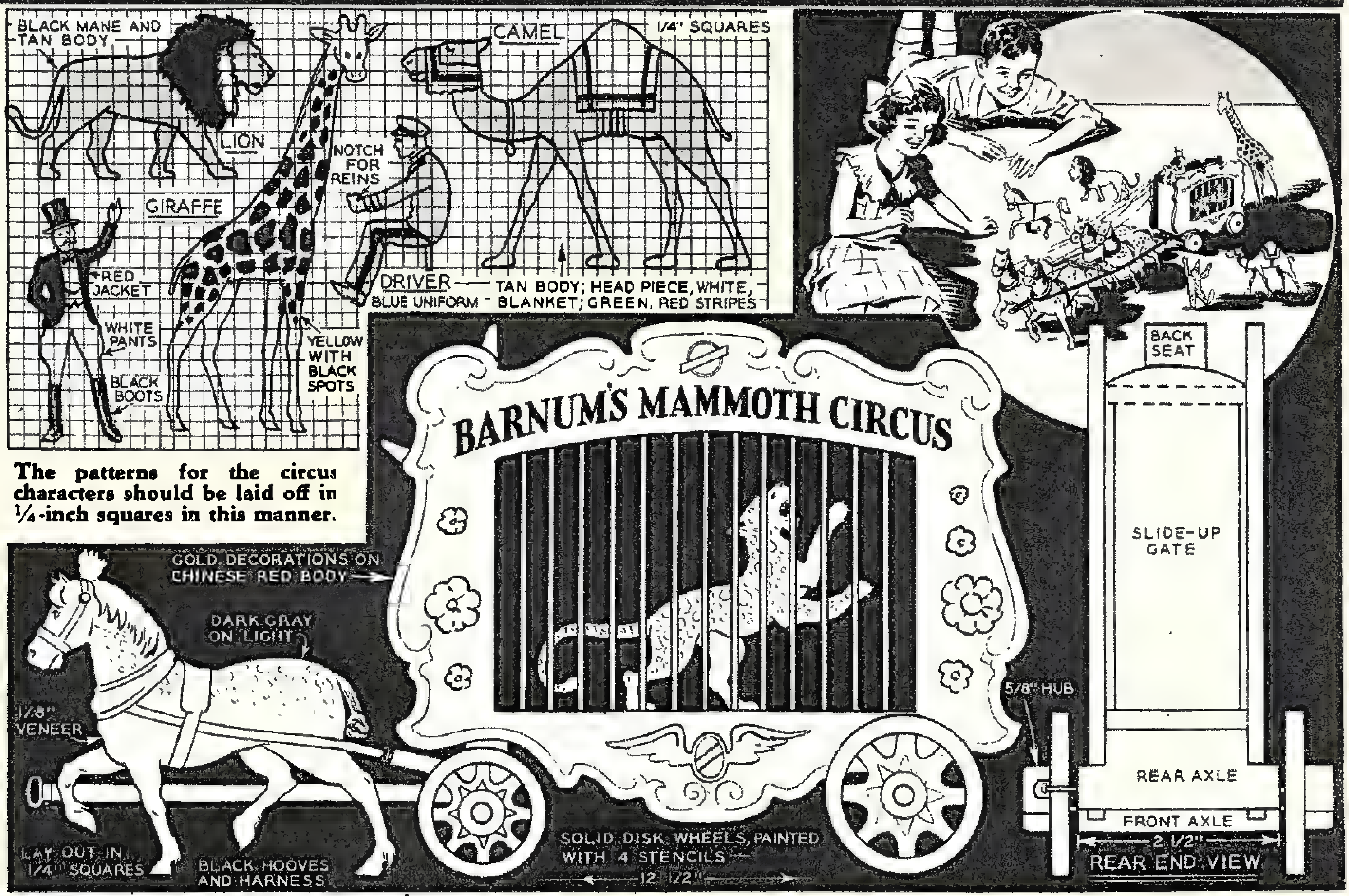
SECTION THRU SNOW TRACK ON CURVES.


WET DOWN AND ICED
CHUTE BUILT AGAINST BANK OR A SMALL SHED OR BARN
75'0" RADIUS
BANK STEEPLY
END
DIMINISHING BANK

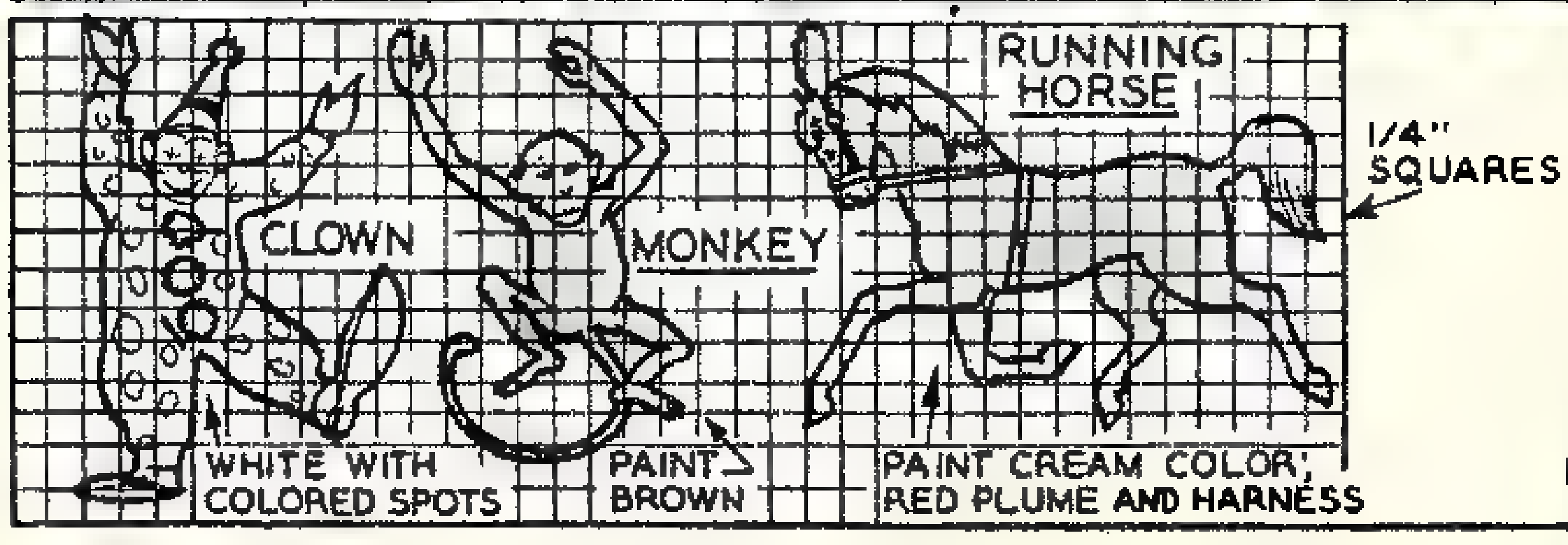
SUGGESTED LAYOUT FOR A BANKED SNOW TRACK

CONSTRUCTED mostly from sections of 2"x4" scrap stock this sled or toboggan slide will provide plenty of winter sport thrills. Install the slide on the side of a hill keeping the angle under 45 degrees as a safety measure. Lay out a banked track according to the suggested layout shown so that you return to the starting point. A catch is provided so that the toboggan can be attached to the chute while riders are taking their places.

A CHRISTMAS CIRCUS FOR KIDDIES


BLACK MANE AND TAN BODY
LION
GIRAFFE
CAMEL
1/4" SQUARES
NOTCH FOR REINS
RED JACKET
WHITE PANTS
BLACK BOOTS
YELLOW WITH BLACK SPOTS
DRIVER
BLUE UNIFORM
TAN BODY; HEAD PIECE, WHITE, BLANKET; GREEN, RED STRIPES
BARNUM'S MAMMOTH CIRCUS
GOLD DECORATIONS ON CHINESE RED BODY
DARK GRAY ON LIGHT
1/8" VENEER
LAY OUT IN 1/4" SQUARES
BLACK HOOVES AND HARNESS
SOLID DISK WHEELS, PAINTED WITH 4 STENCILS
12 1/2"
5/8" HUB
BACK SEAT
SLIDE-UP GATE
REAR AXLE
FRONT AXLE
2 1/2"
REAR END VIEW

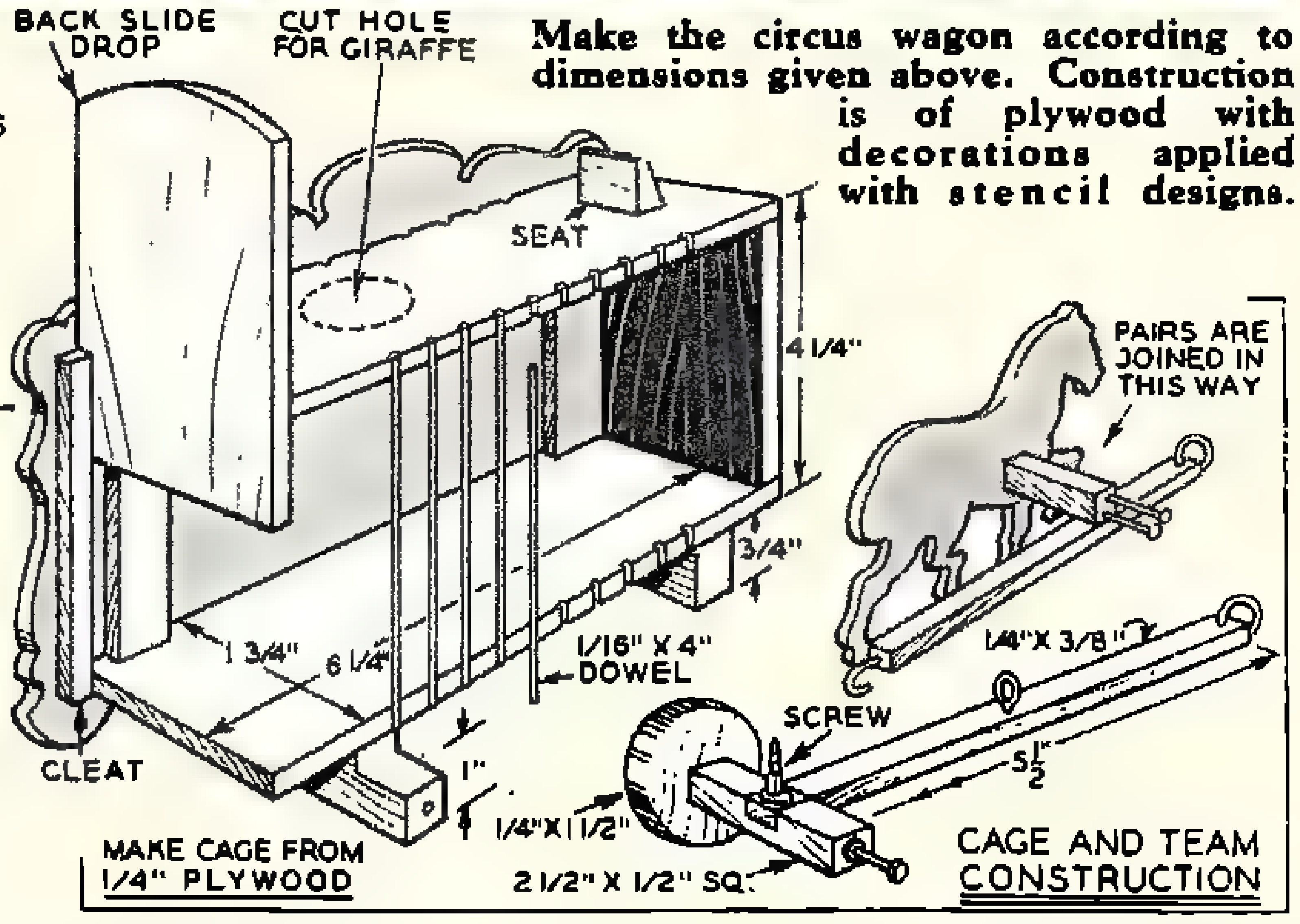
The patterns for the circus characters should be laid off in ¼-inch squares in this manner.


CLOWN
MONKEY
RUNNING HORSE
1/4" SQUARES
WHITE WITH COLORED SPOTS
PAINT BROWN
PAINT CREAM COLOR; RED PLUME AND HARNESS

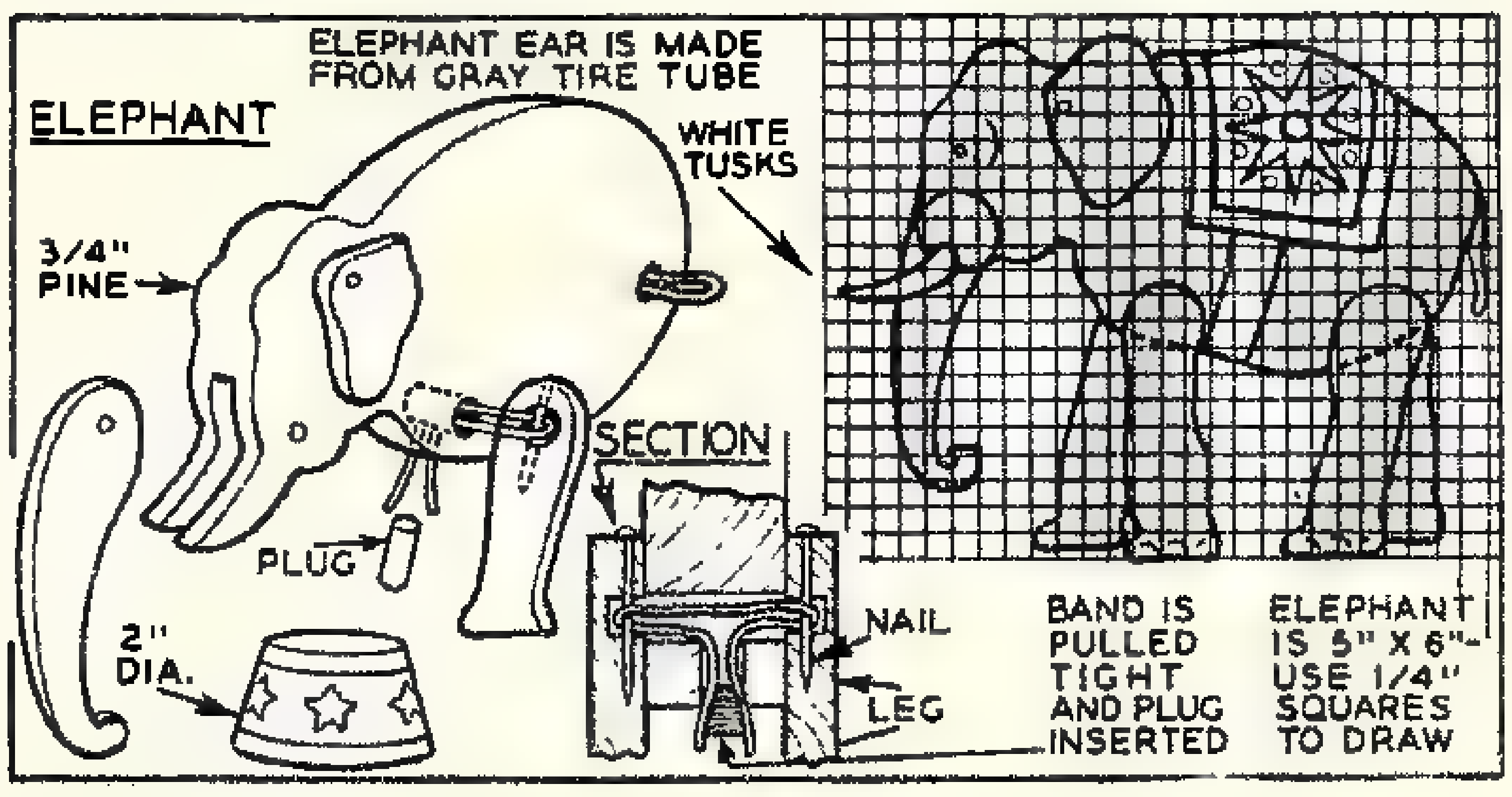
THIS colorful little circus can be built with a scroll saw and paint brush, and is designed for simplicity of construction. Once the bristol-board patterns are made a dozen units can be run off in a short time. Profiles of animal cage, draft horse and driver appear in center illustration. The squared diagram supplies all of the dimensions for the smaller figures which should be cut from thin plywood, or ⅛″ veneer. Quarter-inch plywood is used for the wagon and the wheels, which are solid disks of the sizes given. A quantity of these can be cut on the scroll saw by stacking several pieces of plywood and tacking them together. Four stencils are required for the painting—a red rim, two sizes of 8-pointed stars representing the spokes and another for the black area between the spokes. The cage is painted red with gold decorations. It is best to paint all parts before assembling. The

[*Continued on page* 130]

Make the circus wagon according to dimensions given above. Construction is of plywood with decorations applied with stencil designs.


BACK SLIDE DROP
CUT HOLE FOR GIRAFFE
SEAT
4 1/4"
3/4"
1 3/4"
6 1/4"
1/16" X 4" DOWEL
1"
CLEAT
1/4"X1 1/2"
2 1/2" X 1/2" SQ.
MAKE CAGE FROM 1/4" PLYWOOD
PAIRS ARE JOINED IN THIS WAY
1/4"X 3/8"
SCREW
5 1/2
CAGE AND TEAM CONSTRUCTION

Applicator dowels as used by doctors make excellent bars for the wild animal cage. A hole in the roof allows the giraffe to protrude his neck. Assemble teams according to diagram.


ELEPHANT EAR IS MADE FROM GRAY TIRE TUBE
ELEPHANT
WHITE TUSKS
3/4" PINE
SECTION
PLUG
2" DIA.
NAIL
LEG
BAND IS PULLED TIGHT AND PLUG INSERTED
ELEPHANT IS 5" X 6"- USE 1/4" SQUARES TO DRAW

This performing elephant can be made to assume all sorts of trick positions to the delight of the kiddies. It is cut from any available stock. Ears are cut from pieces of auto inner tubing.

COMPLETING the

Authentic in every detail this miniature of the famous Mayflower can be built by anyone handy with tools. This final installment covers painting and rigging.

by Erling W. Eklof

PART III

HAVING completed all hull and cabin details on the model *Mayflower* as described in the November and December, 1936, issues of Modern Mechanix Hobbies and Inventions final work on the painting and sail rigging of the ship may be started. In these, the final stages of your model extreme care should be exercised in painting and assembling the sails and their rigging so as to follow out the authentic details as much as possible.

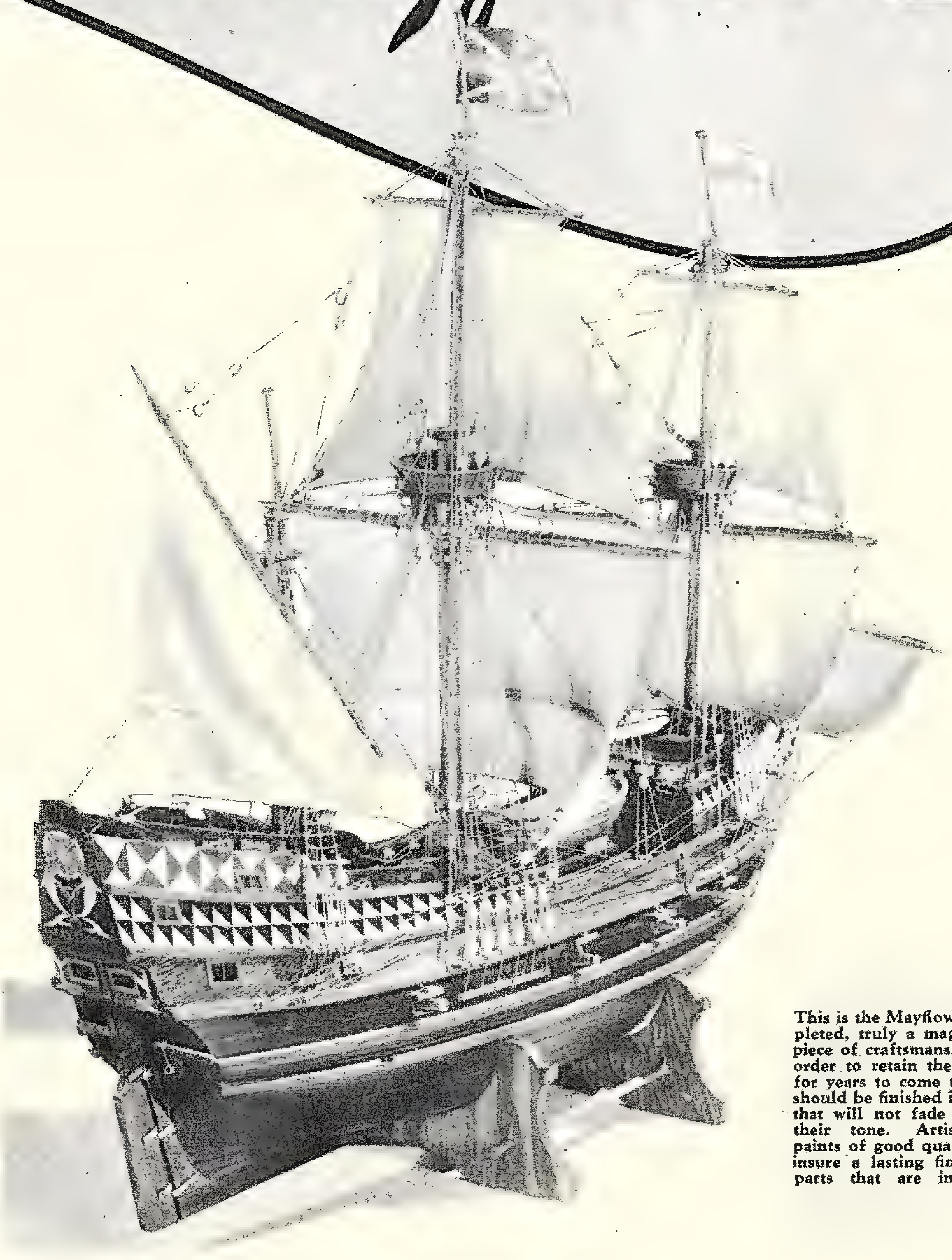
For painting the model, you will need at least one small sharply pointed brush to get into the small places and one flat ½-inch chisel shaped brush. You will also need one can of light oak stain and one can dark mahogany. To get the desired shades mix these two stains in varying proportions. Blue, white and black enamel and varnish will be needed as will tubes of oil paint in yellow ochre, Indian red, raw sienna and dark green.

Now you can start the decks. You want a light natural woody color. Get this by using just a touch of dark mahogany in light oak stain. Don't let it get too dark. You want some contrast between the decks and deck fittings which will run to a little darker than medium brown. Make the inside of the bulwarks a little darker than the decks, and the timberheads a shade darker with railings and steps quite dark. You will find by rubbing a little Indian red on the steps, ladders and rails that they will get a slightly worn appearance as if human feet and elbows had rubbed off some of the finish.

The outside of the bulwark and wales is a rich brown chestnut color. The channel between the lower wales is black with Indian red brushed in and under the beak and trail boards some musty dark green. Below the wales, stain the hull dark brown. Rub some yellow ochre along under the water line where the hull has its greatest beam. Rub or brush in dark green under the counter and under her belly coming up in close to the stem. Blend in these colors as if worn in by the ravages of time. On the trail boards and rails at the beak the conventional design of the time in black and white and blue and white should be carefully painted on. The same applies to the stern castle sides. I chose blue because it is a symbol of water and the sea; also designating faith and hope which is particularly appropriate to the pilgrim ship. Over the design, rub in a few light rusty stains; just enough to make it appear old. Paint a fine thin red line on the upper edge. Make the masts and yards a medium reddish brown, the panels in the doors black. The indentations on the fluted capstan and the top of the capstan are black. The cleats are light and worn. Paint the long boat the same as the hull of the ship. The thwarts and sail locker are a natural wood color. Stain the oars and mast. The wales of the long boat should be light.

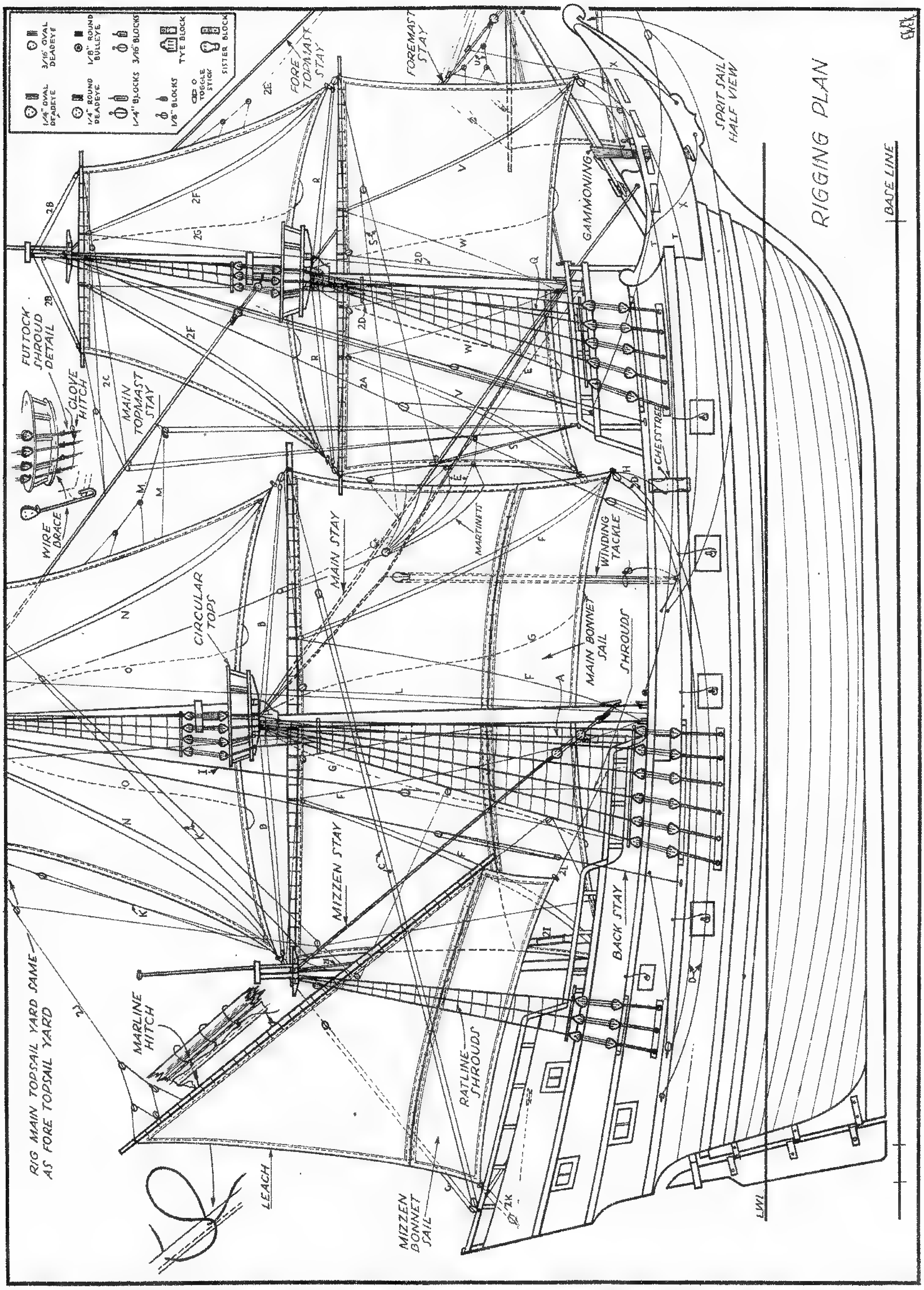
In regard to the design on the stern of the *Mayflower*, you need not adhere to my origination providing you have an appropriate design of your own. May I describe the symbolic significance of the design. The flower at the top of the design is a semi-heraldic rose, the rose being, as you perhaps know,

MODEL Mayflower



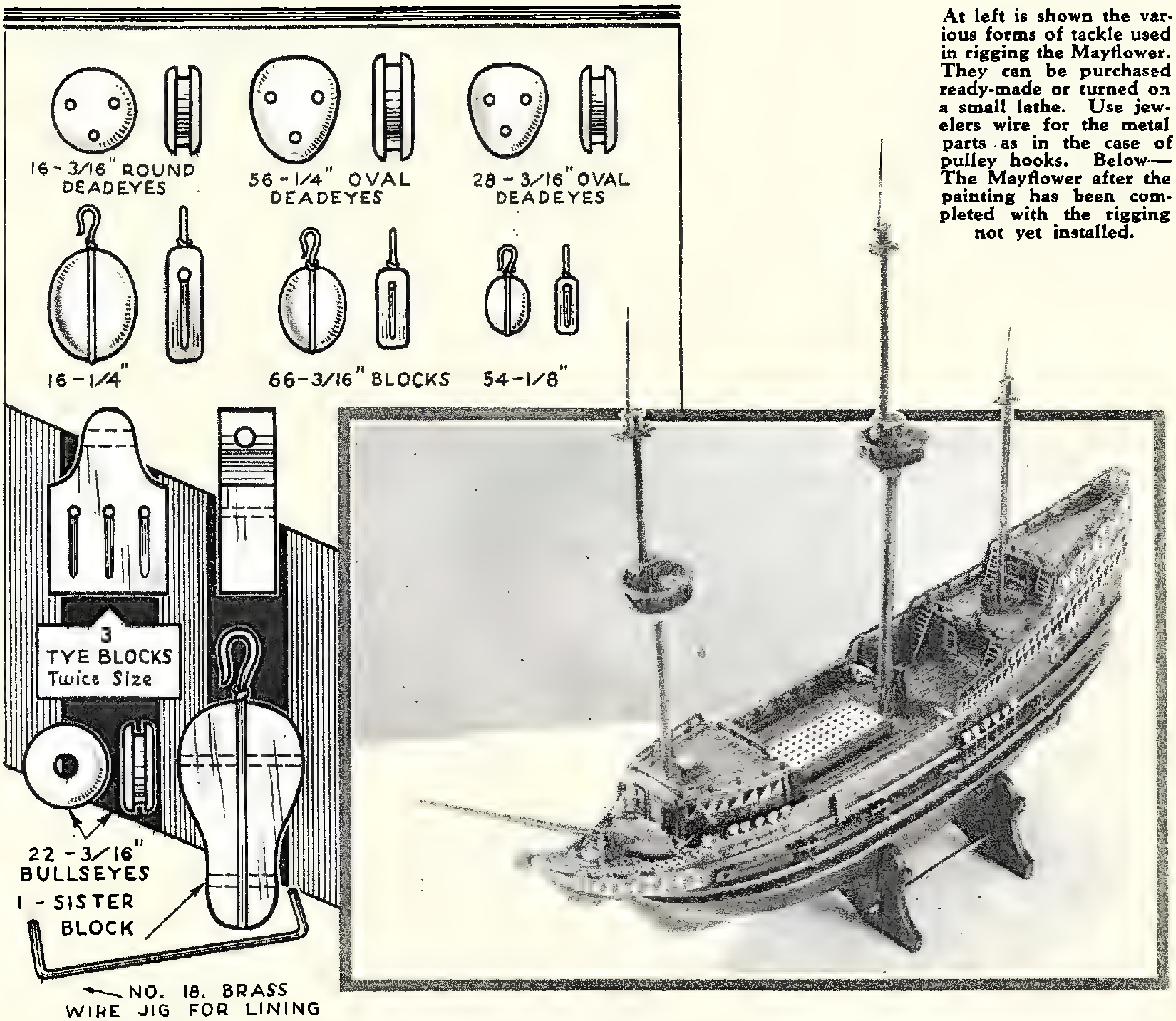
This is the Mayflower completed, truly a magnificent piece of craftsmanship. In order to retain the beauty for years to come the ship should be finished in stains that will not fade or lose their tone. Artists' oil paints of good quality will insure a lasting finish for parts that are in color.

PLAN Simplifies the RIGGING of Mayflower Model



1/4" OVAL DEADEYE
3/16" OVAL DEADEYE
1/4" ROUND DEADEYE
1/8" ROUND BULLEYE
1/4" BLOCKS
3/16" BLOCKS
1/8" BLOCKS
TYE BLOCK
TOGGLE STICK
SISTER BLOCK
RIGGING PLAN
BASE LINE
LWL
SPRIT SAIL HALF VIEW
FOREMAST STAY
FORE TOPMAST STAY
GAMMONING
CHESSTREE
FUTTOCK SHROUD DETAIL
CLOVE HITCH
MAIN TOPMAST STAY
WIRE BRACE
MARTINETT
MAIN STAY
WINDING TACKLE
CIRCULAR TOPS
MAIN BONNET SAIL
SHROUDS
MIZZEN STAY
BACK STAY
MARLINE HITCH
RATLINE SHROUDS
RIG MAIN TOPSAIL YARD SAME AS FORE TOPSAIL YARD
LEACH
MIZZEN BONNET SAIL

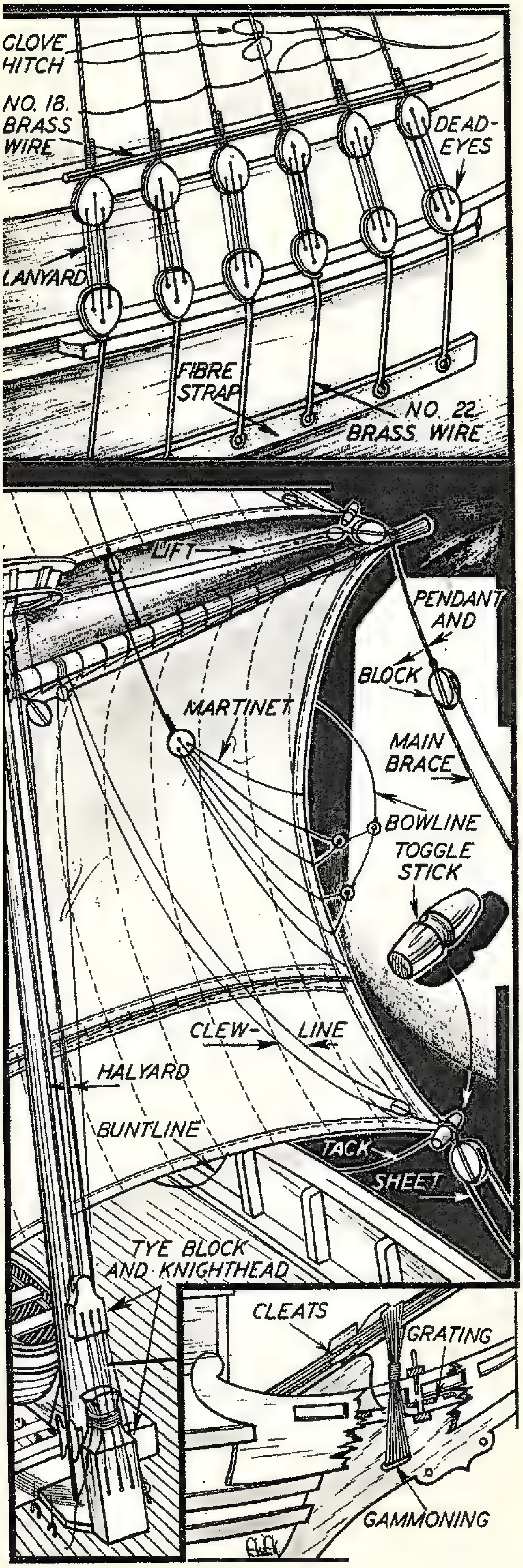
In rigging model be sure to use grade of cord called for, heavy, light or medium linen cord is used in the work. The linen cord may be stained with oil color to add an authentic touch. Needle with closed end of head broken off and crocheting needle make handy rigging tools.



At left is shown the various forms of tackle used in rigging the Mayflower. They can be purchased ready-made or turned on a small lathe. Use jewelers wire for the metal parts as in the case of pulley hooks. Below—The Mayflower after the painting has been completed with the rigging not yet installed.

the floral symbol of England. Since the *Mayflower,* as far as we know, was not in the King's service or owned by nobility, it seems reasonable that the pure heraldic rose would not be particularly significant. The dolphins, the symbol of the religious life and Resurrection is appropriate to the pilgrim ship and in addition is a sea ornament very often used. Paint them green with yellow bellies and fins. The ray-like background behind the rose represents the light and the new way to freedom. Paint the stripes alternately Prussian blue and dull carmen. The urn of earth representative of the humble characteristics of the pilgrims supports the flower and the dolphins. It is painted red with a gold wing design outlined with light green lines. The background behind the urn and around the dolphins may be painted Prussian blue or stained dark brown. The name *Mayflower* in red goes underneath.

Rigging your model is next and should be carefully done. For this you will want four sizes of cord, heavy, medium, light and fine. You will need 56 ¼-in. heart shaped deadeyes, 28 $\frac{3}{16}$-in. deadeyes heart shaped and 16 round $\frac{3}{16}$-in. deadeyes, 22 $\frac{3}{16}$-in. bull's-eyes, 54 ⅛-in. single blocks and 66 $\frac{3}{16}$-in. single blocks, 16 ¼-in. single blocks, 3 tye blocks and 1 sister or fiddle block. You can use round deadeyes in place of the heart shaped as perhaps they are a bit easier to make. Boxwood or gumwood is used for deadeyes and blocks. Round deadeyes and bull's-eyes can be turned on a lathe in this manner, using a dowel stick of the required size and about 8 in. long. With a special tool about the thickness of an ordinary table knife, cut a groove almost to the center, leaving enough wood to prevent it from breaking off too easily, then cut the slight groove that goes around the deadeye. Cut deep again to form the other side of the deadeye. Repeat for the next deadeye, remove from the lathe and cut the separate deadeyes apart. Make a little tube or cup to hold two or three deadeyes, one above the other. Drill the three holes required. Bull's-eyes can be made the



The topmost illustrations show the Lanyard threading and dead-eye mounting arrangements. Sail rigging is simplified by lower diagrams showing how linen threads fasten to tackle.

same way. Drill one hole in place of three. By flattening the sides of the dowel, blocks may be made in the same fashion. Drill one hole near one end of the block. In the event that you have no lathe to use, you can reverse the process, drilling the holes in the end of the dowel, then grooving and cutting off with a hand scroll saw. Very fine blocks and deadeyes can also be purchased from ship model supply houses. It is essential that deadeyes and blocks should not be used too large or the appearance of the whole model will be spoiled.

Concerning the sizes of cord for rigging, the heavy rigging used for shrouds will be No. 5 mercerized crocheting cotton. For the medium, No. 10; for the light, No. 40, and for the fine used for lanyards and ratlines, No. 60 serves very well. This may be obtained at any dry goods store. Dye the heavy, medium brown, and the medium cord, just a tint lighter. The light and fine cord numbers 40 and 60 respectively should be dyed a tan color, a shade darker than ecru. To do this, draw the cord through dye or stain of the desired shade. If you wish, you may use linen fish line which, outside of being stronger, has no particular advantage.

After having stepped the masts glue in the bowsprit and lash it down with the gammoning. Use the heavy cord for this. Throw a hitch around the bowsprit and slide it down to the cleat. The cord goes through the forward end of the slit in the cutwater from the port side to the starboard. Then up around the bowsprit from starboard to port for about eight turns. Wind the cord around each half of this lashing and secure it with a clove hitch so you will be able to wind about five turns around the whole of the lashing. Fasten the end with a good knot and the gammoning is completed.

Next come the chain plates. They are the straps that go around the deadeyes and secure them in their position just above the chain wales. They are made of No. 22 brass or aluminum wire. Bend the wire around the deadeye and make a twist to secure it and then below where it fastens to the hull, make a small eye in the wire to take a pin. Where the chain plates are secured to the hull, there is an iron strap (make this with red fibre) that follows the sheer line. Be careful to keep the deadeyes even.

After you have all the chain plates and their deadeyes in place, take a piece of heavy cord and seize it around a ¼-in. deadeye. To aid in setting up the shrouds, make a U shaped sharp cornered form from No. 22 wire to hold the deadeyes about two of their lengths apart. Insert this wire form in the hole of a left hand deadeye on the chain wale and put the other end through the deadeye seized to the heavy cord. Now pass the cord up through the lubbers hole, around the mast and down through the lubbers hole on the same side, and seize a deadeye to its lower end, even with the first. Draw a lanyard of fine cord through these two deadeyes in this manner. First tie a knot in one end of an 8-in. cord. Reeve this through the right hand lower hole of the upper deadeye looking from the outside with the knot in back, then down to the upper right hand hole in the lower deadeye, then up to the middle hole of the upper deadeye, down on the outside to the corresponding hole in the lower deadeye, up again to the remaining hole in the upper deadeye, and down to the left hand hole in the lower deadeye and fasten with a clove hitch where the shroud is seized to the upper deadeye. Do not cut off the loose end as yet. Now take the wire form off of the first set of deadeyes and run the lanyards through them. Draw the deadeyes even and secure with clove hitches. Cut off the loose ends. Seize the two shrouds together directly under the cross trees. Do the same on the port side then back to the starboard and continue until all the lower main shrouds are on. Keep the mast in the central position, but leaning aft a little more than one part in thirty. When the main stays are put on, they will pull it forward to its correct position.

The fore and mizzen shrouds are done in the same method, but because of the odd numbers of the shrouds, they go around the masts and to the opposite side instead of in pairs on the same side.

Let's get at the stays. Lay up three parts of heavy cord by fastening the three ends in something firm and twisting the other three ends with an ordinary hand drill. Two cords twisted similarly will serve as the mizzen stays. Saturate them with thin model aeroplane glue to keep them from unraveling. The main stay is double in the form of a strap. It goes up between the cross trees and around the mast; the other end goes through a hole in the stem. The whole stay is pulled together with a lanyard using the $\frac{3}{16}$-in. round deadeyes and passes on each side of the fore mast, the lanyard being situated immediately behind this mast. The fore stay is fastened by a lanyard, its lower deadeye lashed

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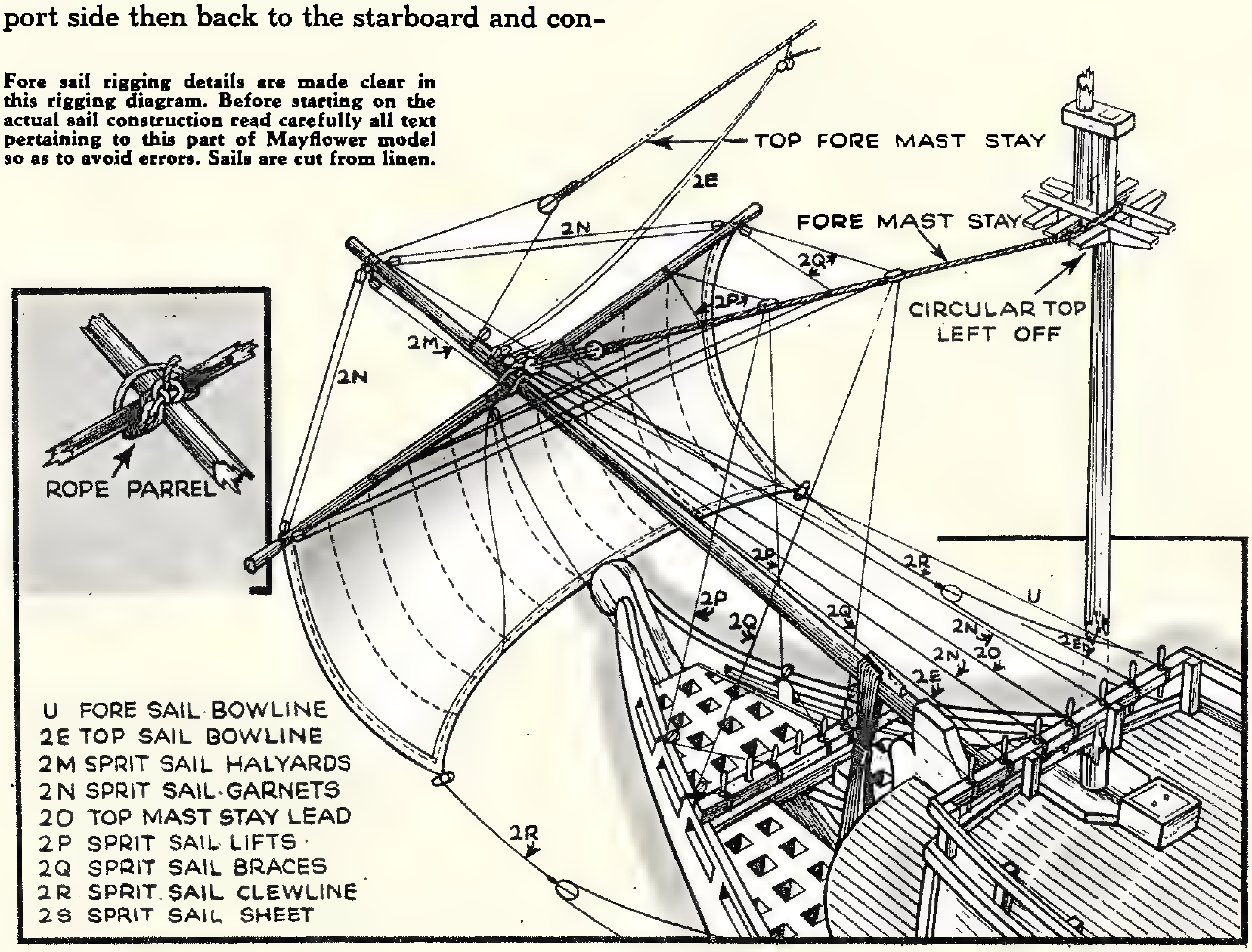
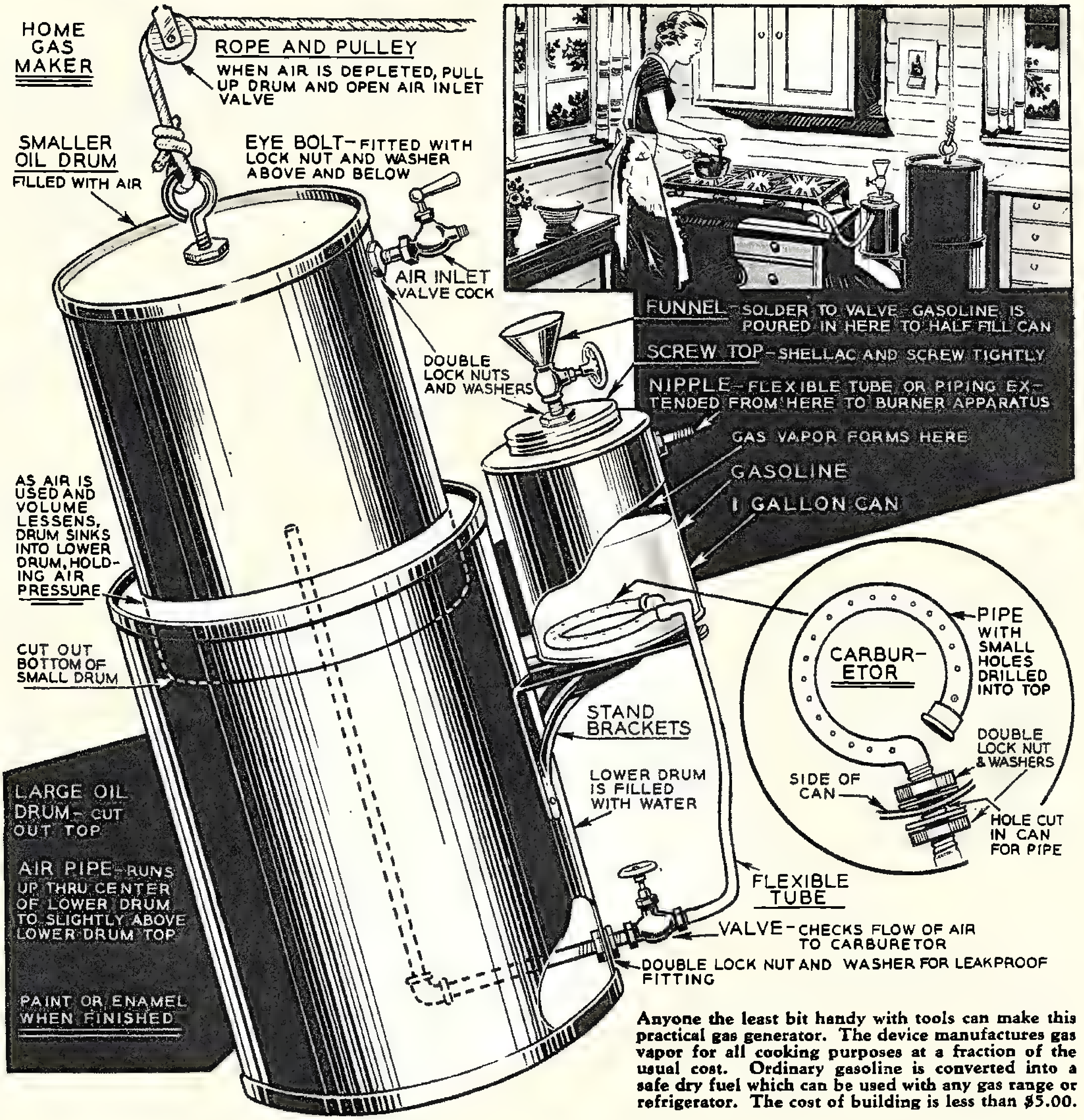

TOP FORE MAST STAY
2E
2N
FORE MAST STAY
2Q
2P
2M
2N
CIRCULAR TOP LEFT OFF
ROPE PARREL
2S
2R
2P
2Q
2Q
2R
U
2N
2O
2N
2E
2E
2R
U FORE SAIL BOWLINE
2E TOP SAIL BOWLINE
2M SPRIT SAIL HALYARDS
2N SPRIT SAIL GARNETS
2O TOP MAST STAY LEAD
2P SPRIT SAIL LIFTS
2Q SPRIT SAIL BRACES
2R SPRIT SAIL CLEWLINE
2S SPRIT SAIL SHEET

Fore sail rigging details are made clear in this rigging diagram. Before starting on the actual sail construction read carefully all text pertaining to this part of Mayflower model so as to avoid errors. Sails are cut from linen.

GENERATOR MAKES GAS FOR COOKING


HOME GAS MAKER
ROPE AND PULLEY - WHEN AIR IS DEPLETED, PULL UP DRUM AND OPEN AIR INLET VALVE
SMALLER OIL DRUM FILLED WITH AIR
EYE BOLT-FITTED WITH LOCK NUT AND WASHER ABOVE AND BELOW
AIR INLET VALVE COCK
FUNNEL-SOLDER TO VALVE. GASOLINE IS POURED IN HERE TO HALF FILL CAN
SCREW TOP-SHELLAC AND SCREW TIGHTLY
DOUBLE LOCK NUTS AND WASHERS
NIPPLE-FLEXIBLE TUBE OR PIPING EXTENDED FROM HERE TO BURNER APPARATUS
GAS VAPOR FORMS HERE
GASOLINE
1 GALLON CAN
AS AIR IS USED AND VOLUME LESSENS, DRUM SINKS INTO LOWER DRUM, HOLDING AIR PRESSURE
PIPE WITH SMALL HOLES DRILLED INTO TOP
CARBURETOR
CUT OUT BOTTOM OF SMALL DRUM
STAND BRACKETS
DOUBLE LOCK NUT & WASHERS
SIDE OF CAN
HOLE CUT IN CAN FOR PIPE
LOWER DRUM IS FILLED WITH WATER
LARGE OIL DRUM-CUT OUT TOP
AIR PIPE-RUNS UP THRU CENTER OF LOWER DRUM TO SLIGHTLY ABOVE LOWER DRUM TOP
FLEXIBLE TUBE
VALVE-CHECKS FLOW OF AIR TO CARBURETOR
DOUBLE LOCK NUT AND WASHER FOR LEAKPROOF FITTING
PAINT OR ENAMEL WHEN FINISHED

Anyone the least bit handy with tools can make this practical gas generator. The device manufactures gas vapor for all cooking purposes at a fraction of the usual cost. Ordinary gasoline is converted into a safe dry fuel which can be used with any gas range or refrigerator. The cost of building is less than $5.00.

by A. H. Waychoff

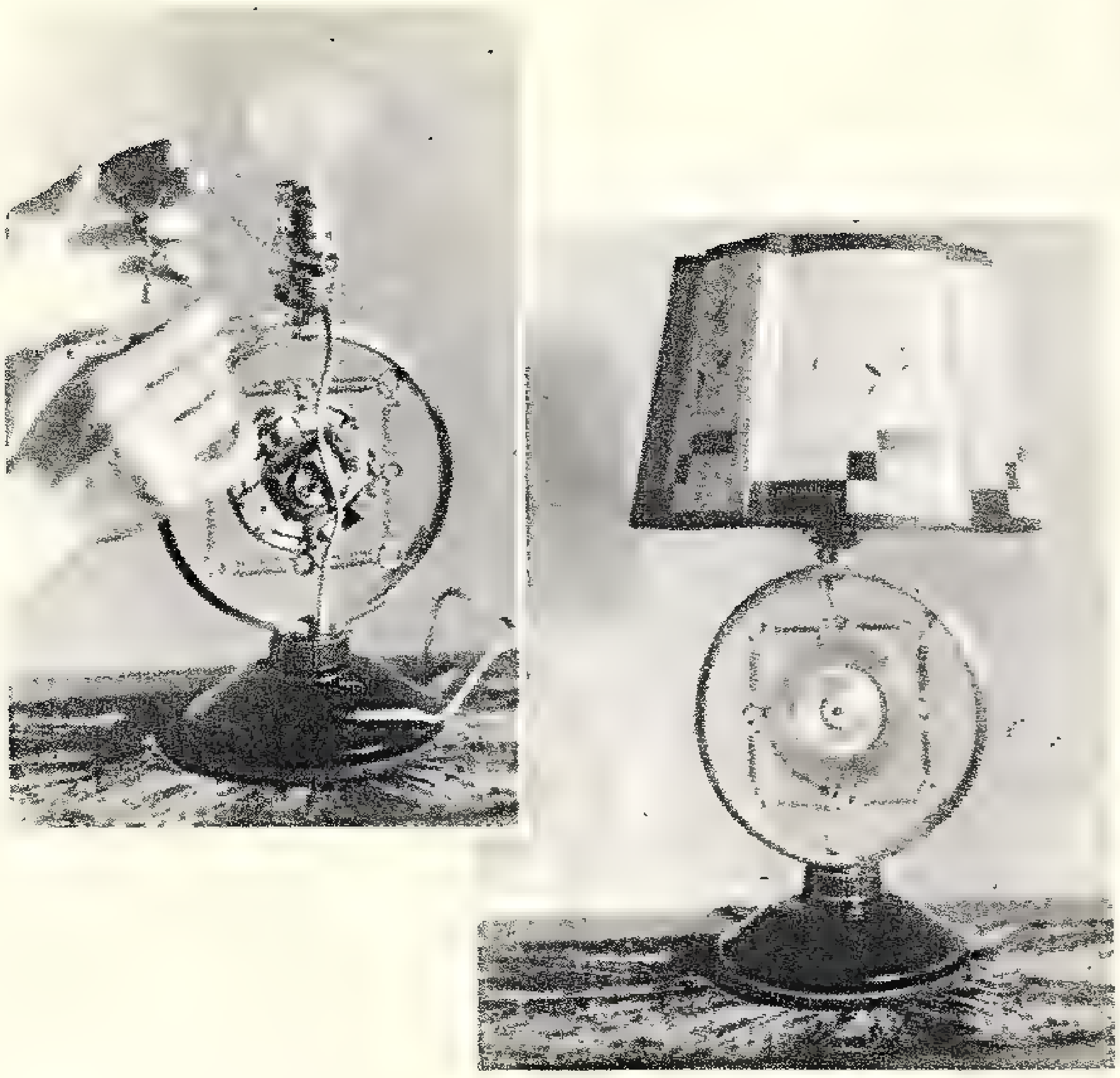
NO LONGER need any home be without the conveniences offered by city gas. A practical gas generator can be built with ordinary tools at a cost well under five dollars and when completed will produce a safe vapor gas at a cost far below that of either artificial or natural cooking gases.

The generating apparatus consists of a pressure tank and vaporizing unit. While an ordinary air compressor could be used to operate the vaporizer, the pressure tank is by far the most economical, since two oil drums are the only materials, except for a few pieces of pipe, needed to build it. The vaporizer consists of a one-gallon can containing a "carburetor" which mixes the air from the compression tank with liquid fuel, in this case good gasoline, to produce a safe vapor gas. The carburetor is a simple affair, consisting of a length of pipe drilled along the top with small holes, plugged at one end and bent into a circle just large enough to fit in the bottom of the one-gallon can. The carburetor connects to the pipe projecting up through the large oil drum by means of a flexible hose.

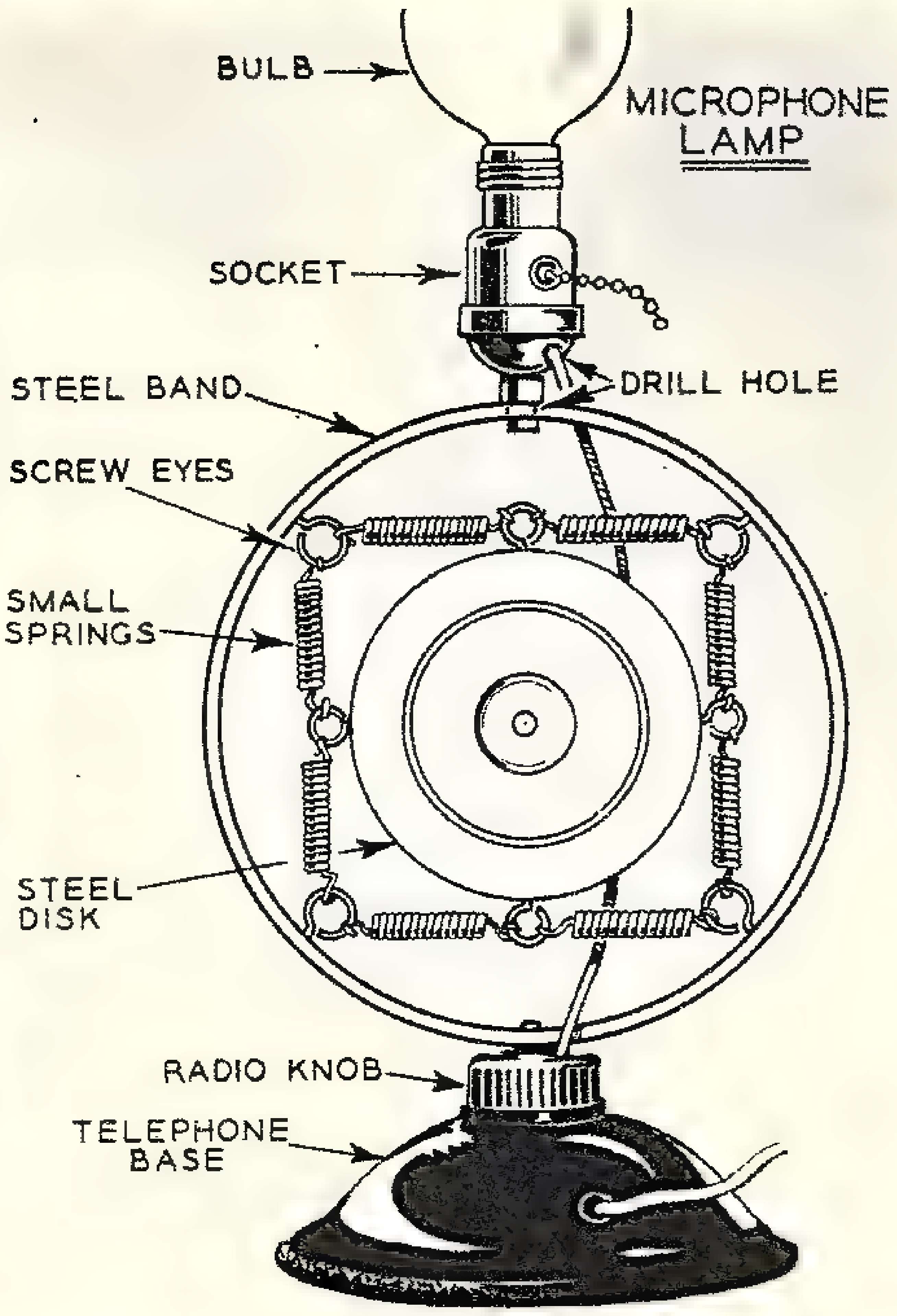
Assemble the compression tanks in the

[*Continued on page* 122]

"MIKE" LAMP SERVES AS RADIO DECORATION



Fashioned from odds and ends this attractive microphone lamp provides novel illumination for radio receiver. Phone base, radio knob, springs and piston ring comprise its form.



LOOKING very much like the familiar radio broadcasting microphone this odd radio lamp will attract the attention of everyone who sees it. Odds and ends are used in the making of the lamp, which uses an old telephone base for the stand, a large size piston ring or metal band for the microphone ring and a turned metal or wooden disc for the dummy microphone.

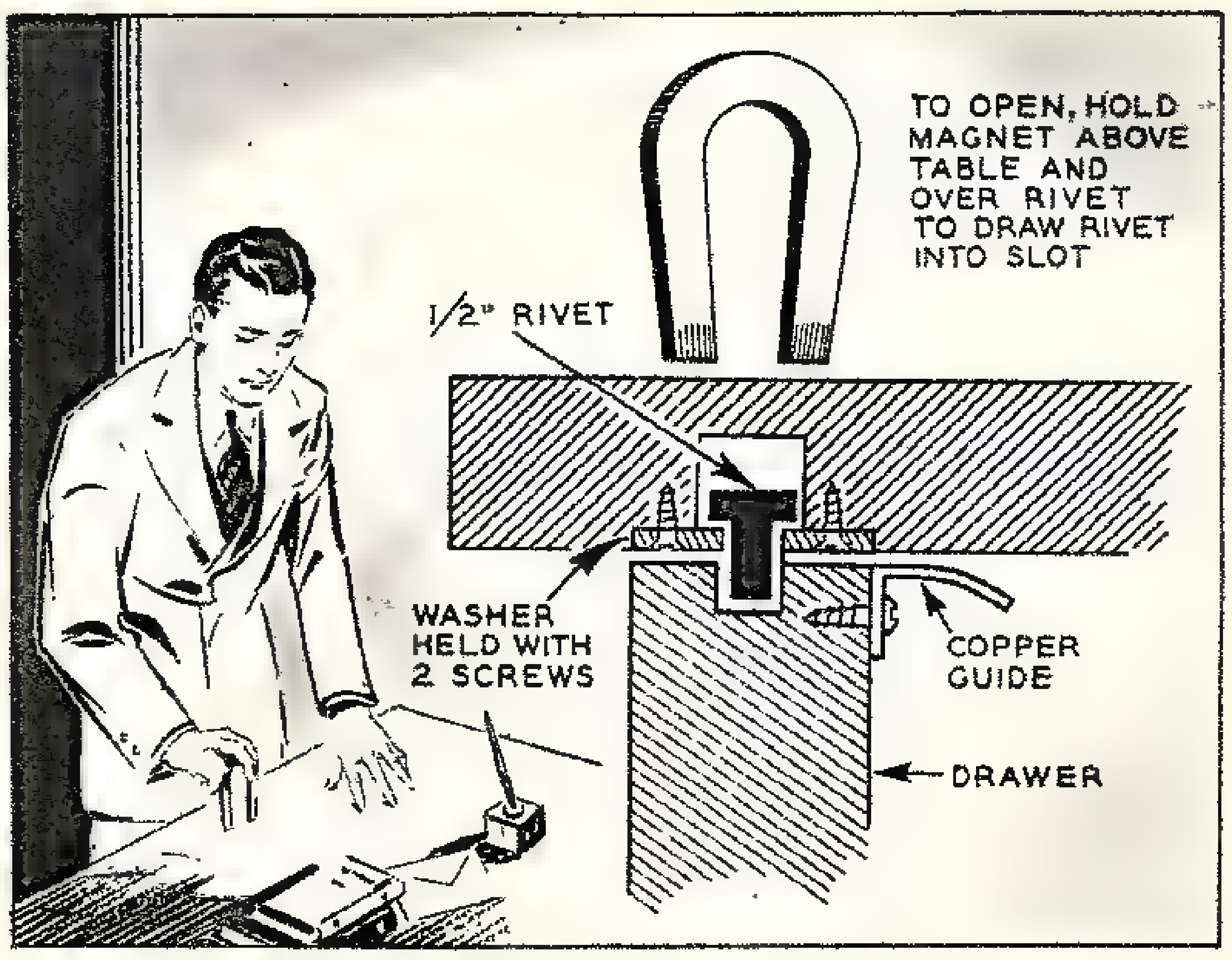
Two holes large enough to pass a medium sized machine screw are drilled in the ring opposite each other. A bolt passed through one holds a chain socket in place while the lower hole serves to take a longer bolt which holds the ring, radio knob and base assembly. Small holes into which screw eyes can be forced are drilled at proper intervals for the attachment of the springs.

The microphone dummy is a wood or metal disc about 3¼ inches in diameter. After the turning is completed it can be painted with aluminum bronze and trimmed with black enamel. Four screw eyes are attached to the side of the microphone and the disc suspended in the ring with small wire springs. Should the builder possess an old telephone transmitter or radio earphone unit this can be substituted instead and connected through the radio receiver for stunt broadcasting.

An inexpensive parchment shade clipped over the bulb completes this original radio lamp.

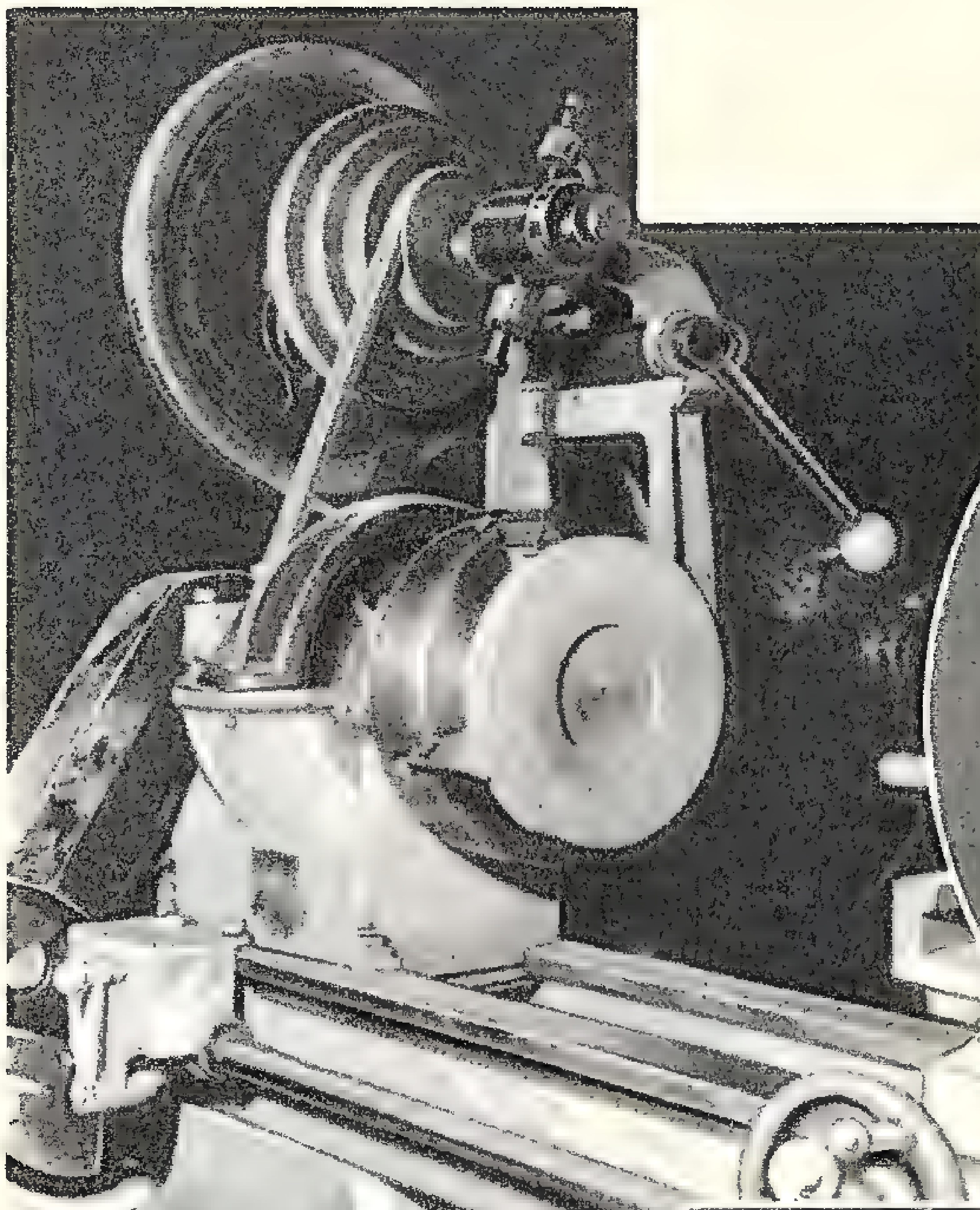
Magnet Opens Secret Lock

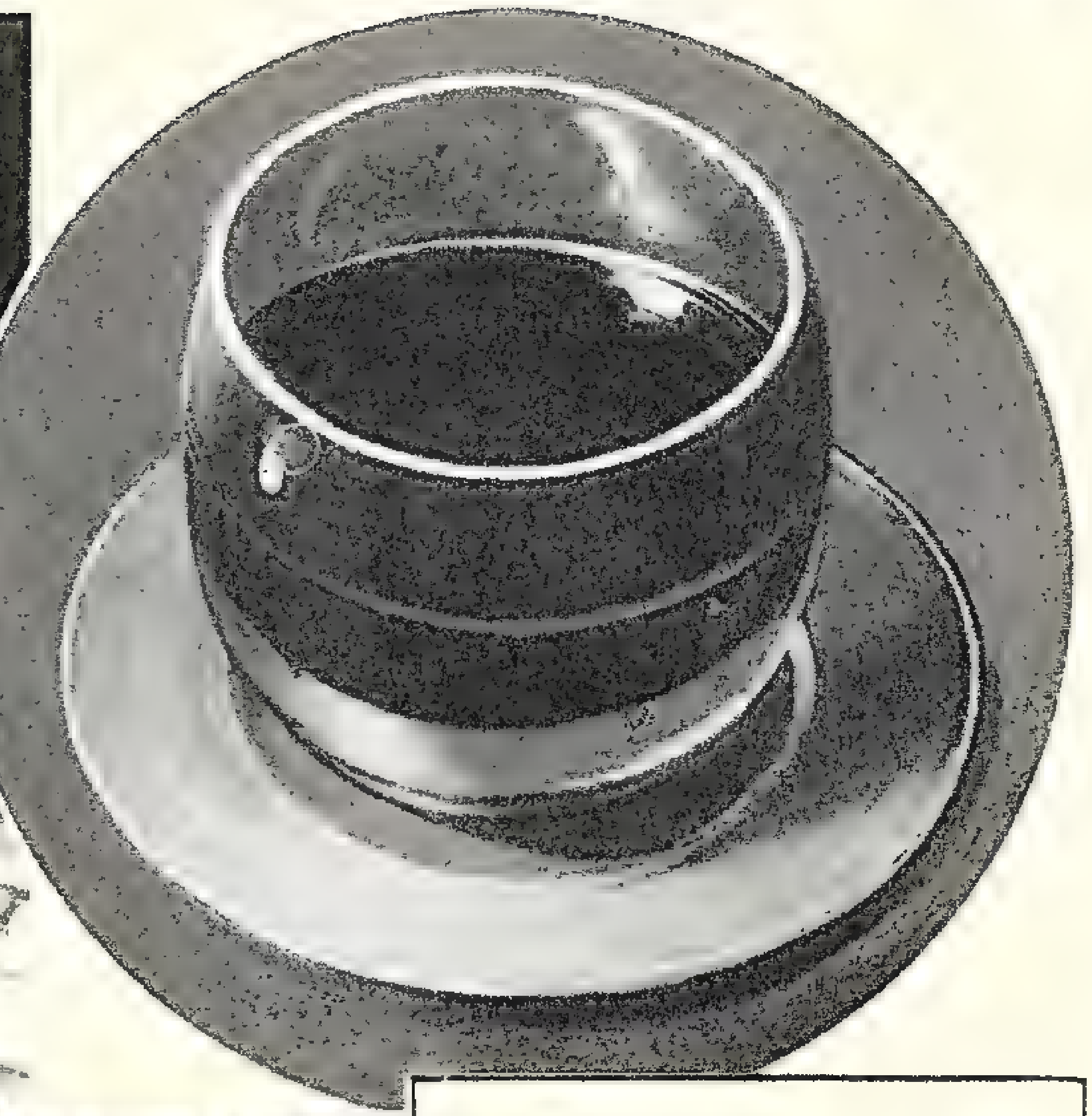
WHERE a practical lock is desired without the objectionable exposed keyhole a magnetic type may be used without anyone discovering the secret of its operation. A hole into which a ½-inch rivet can fit loosely is drilled in the underside of the desk top and a metal plate mounted flush over it so that just the rivet stem may pass through. A hole the size of rivet is then drilled in desk drawer, the copper guide installed and the lock is ready for use. A large magnet serves as key.


TO OPEN, HOLD MAGNET ABOVE TABLE AND OVER RIVET TO DRAW RIVET INTO SLOT
1/2" RIVET
WASHER HELD WITH 2 SCREWS
COPPER GUIDE
DRAWER

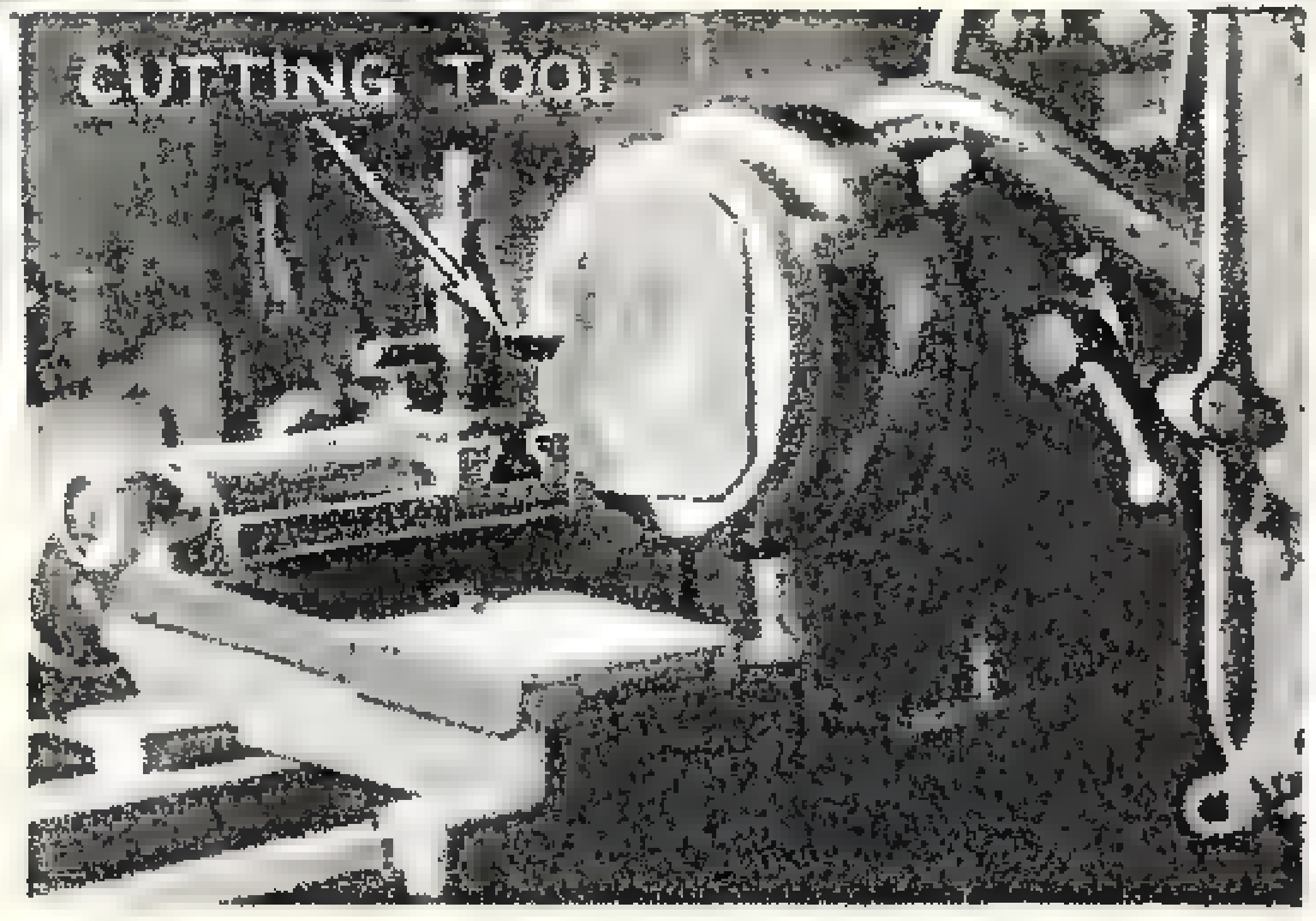
When held directly over the rivet the magnet lifts it, freeing the drawer. A spring copper guide attached directly in back of drawer catch permits its closing without jamming the rivet.

METAL

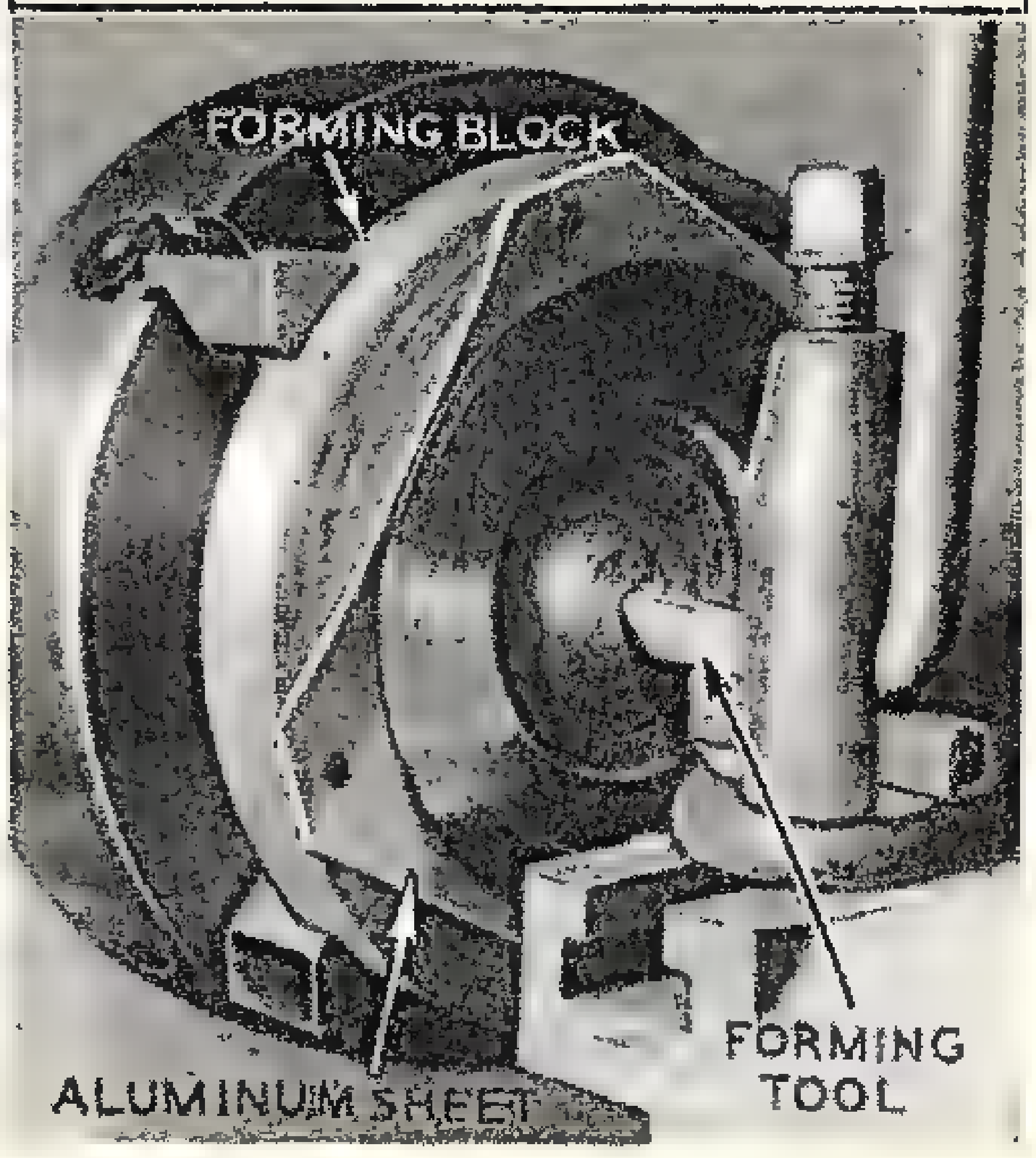




The simple coaster pictured in the circle above is the ideal project for the beginner in metal spinning. Before any actual spinning is done a hardwood form or mold must first be made. Above is shown a completed mould in the lathe.



After the metal sheet has been turned to fit the wooden form the square corners are trimmed off with a regular lathe cutting tool.



Right—In spinning this aluminum dish run the forming tool from the center of the work until the sheet metal follows the shape of the hardwood form.

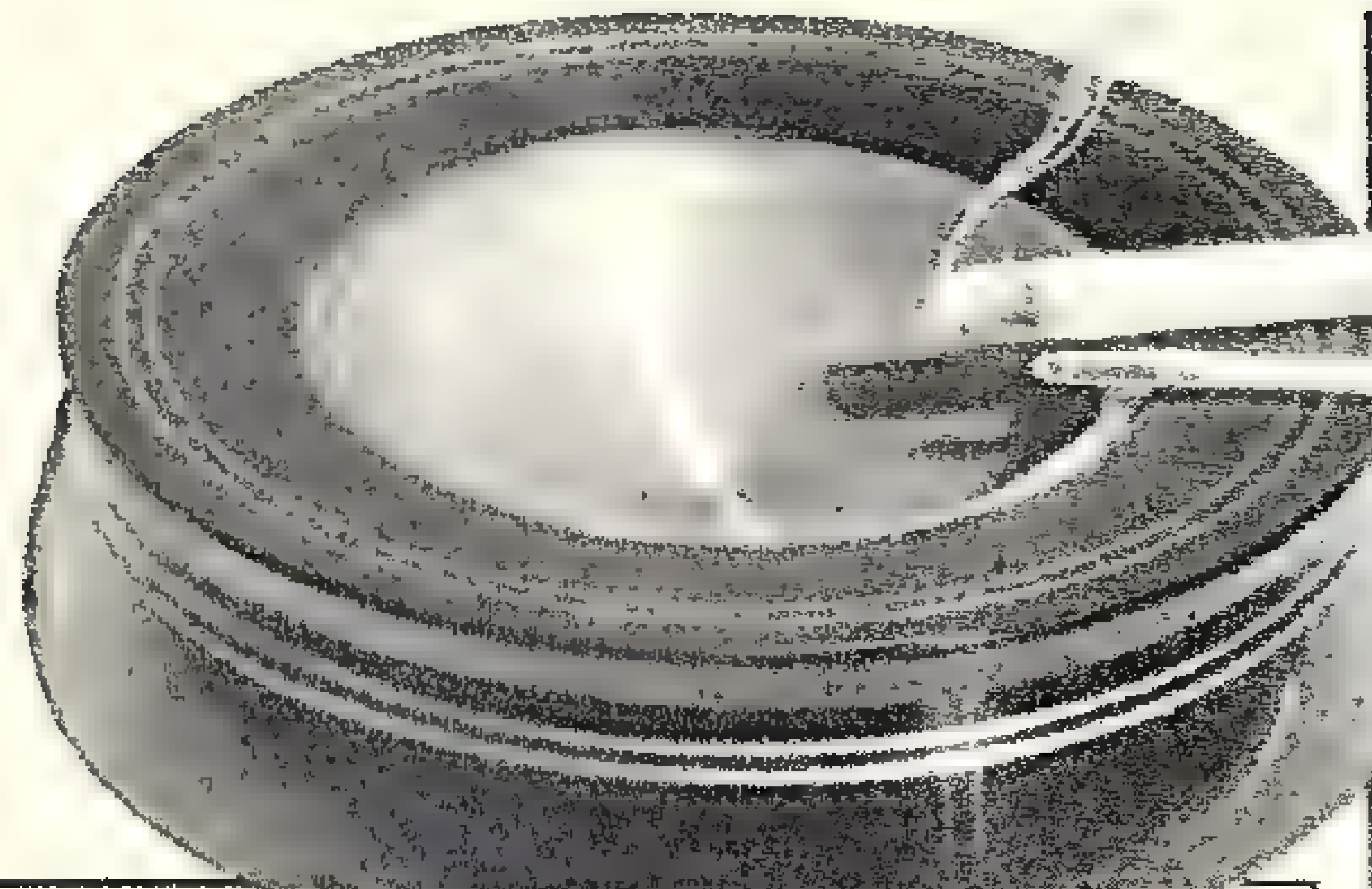
by Dale R. Van Horn

SOME soft metal lends itself so admirably to manipulation in a wood turning lathe, that projects involving its use are an interesting home shop diversion. With some patience one can turn out very presentable creamers, trays and boxes with lids from sheet brass, aluminum and copper.

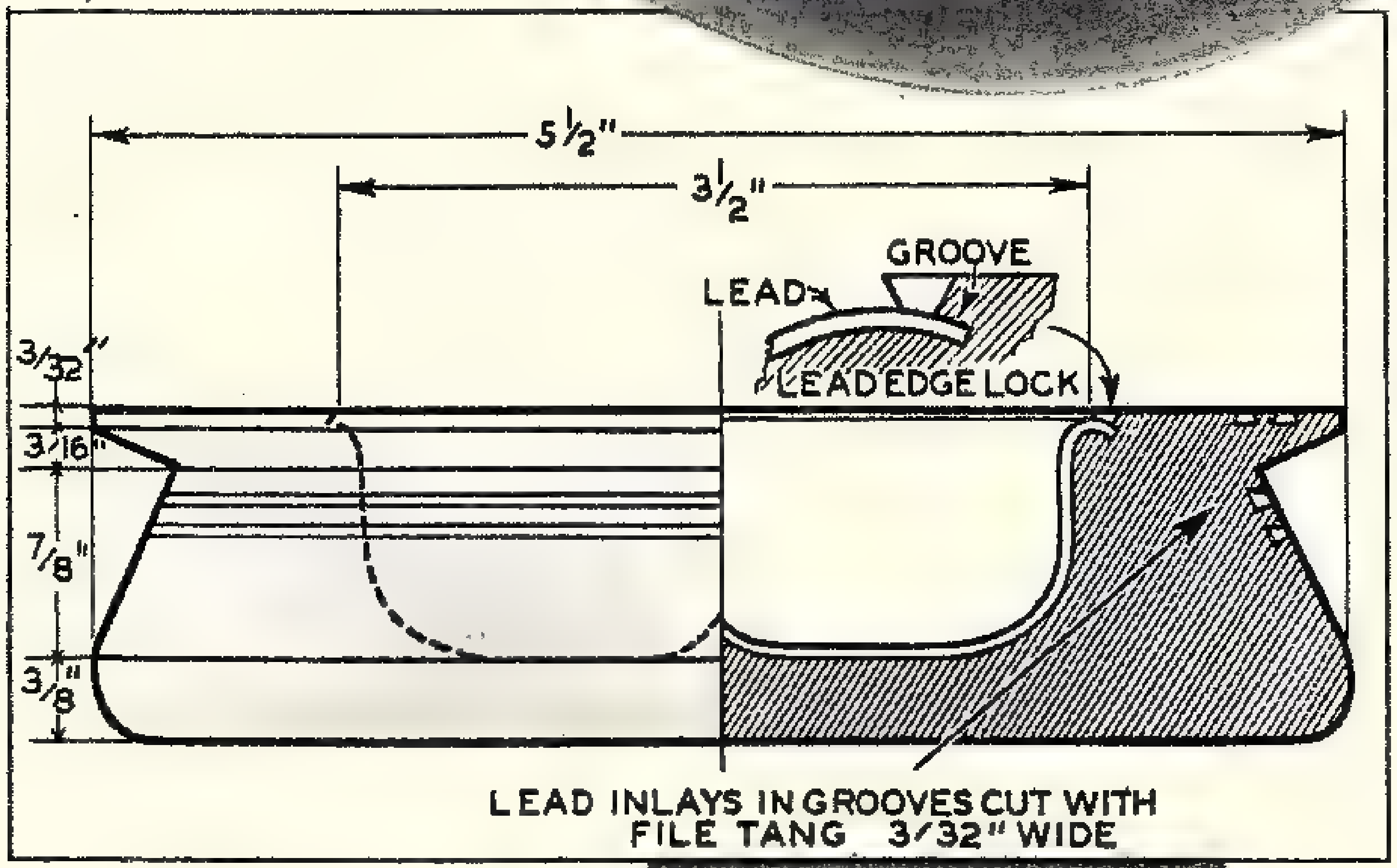
Sheet lead is so ductile, easily worked and bears such a close resemblance to pewter when finished, that this metal is ideal for the beginner in spinning metals. This article covers briefly a number of simple projects, each one easily made. It also touches the use of a metal lathe for harder metals.

One of the easiest ways to spin soft metal dishes is as follows: Briefly, you need two pieces of wood and a sheet of metal. Turn one hardwood block to the shape you desire for the inside of the dish: Turn another small block from 1½ to 2 inches in diameter and about ½ inch thick with one side smooth, the other carrying the deep indentation of the dead center. The sheet of lead is centered between these two blocks, rubbed with candle and the metal gradually forced over the form. Should there be any tendency for the metal to work out of line, make a depression in the right end of the mold not more than the sheet metal thickness in depth and see that the tail stock wood block is a little smaller. Then turn the tail stock up tight. This forms a bulge in the metal sheet which locks it in position so long as the tail stock is turned up snug. After forming, the metal is polished, the waste trimmed off and the piece then dipped in lacquer. Sheet pewter, aluminum, copper and brass can be turned into small, attractive dishes in the same manner.

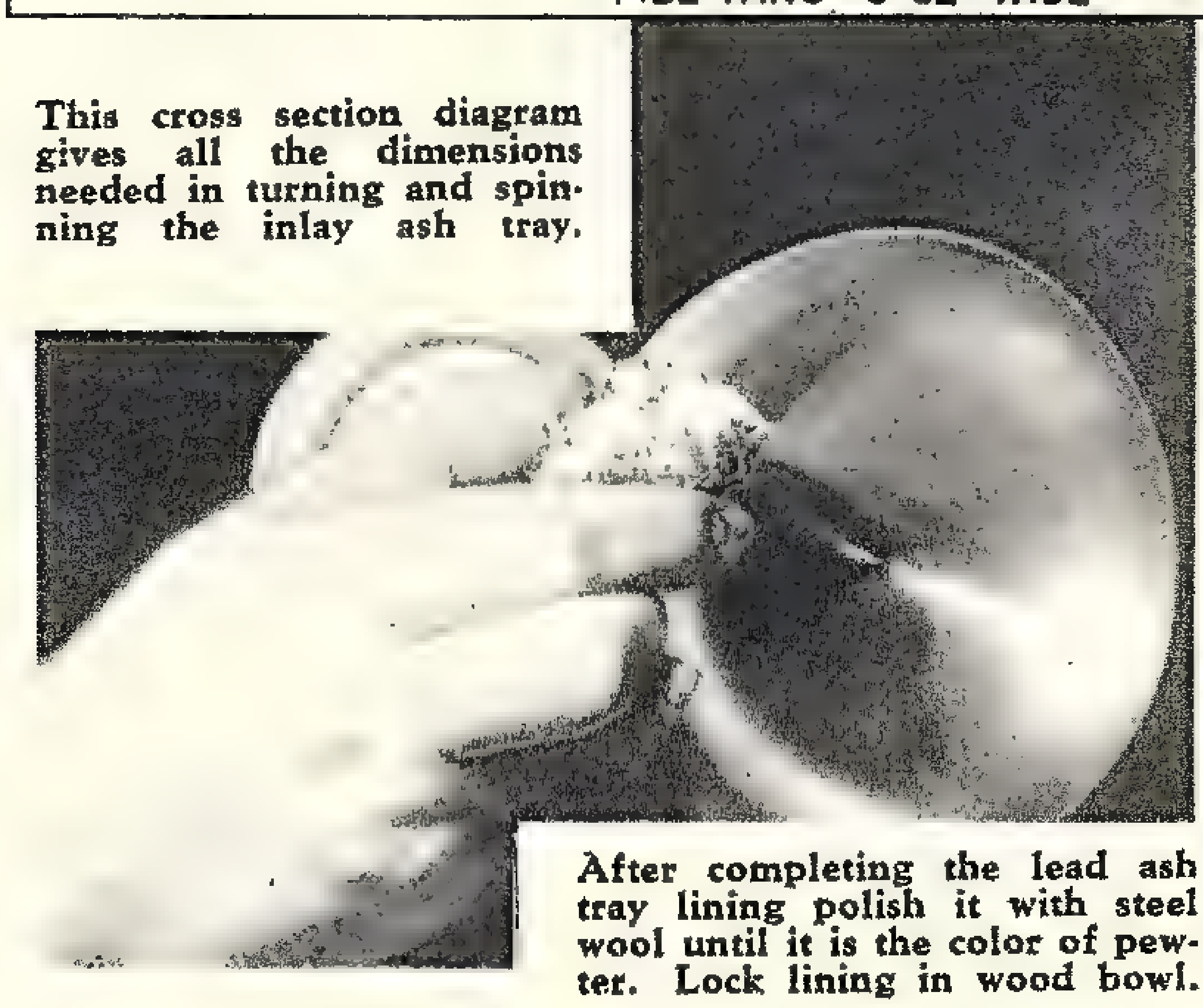
PROJECTS ON A LATHE



This beautiful inlay turning can be duplicated in your shop after doing some experimenting with the more simple projects. The bowl is turned from walnut and the inlays filled with strips of lead. The bowl lining is spun from $\frac{1}{16}$" sheet lead.



This cross section diagram gives all the dimensions needed in turning and spinning the inlay ash tray.



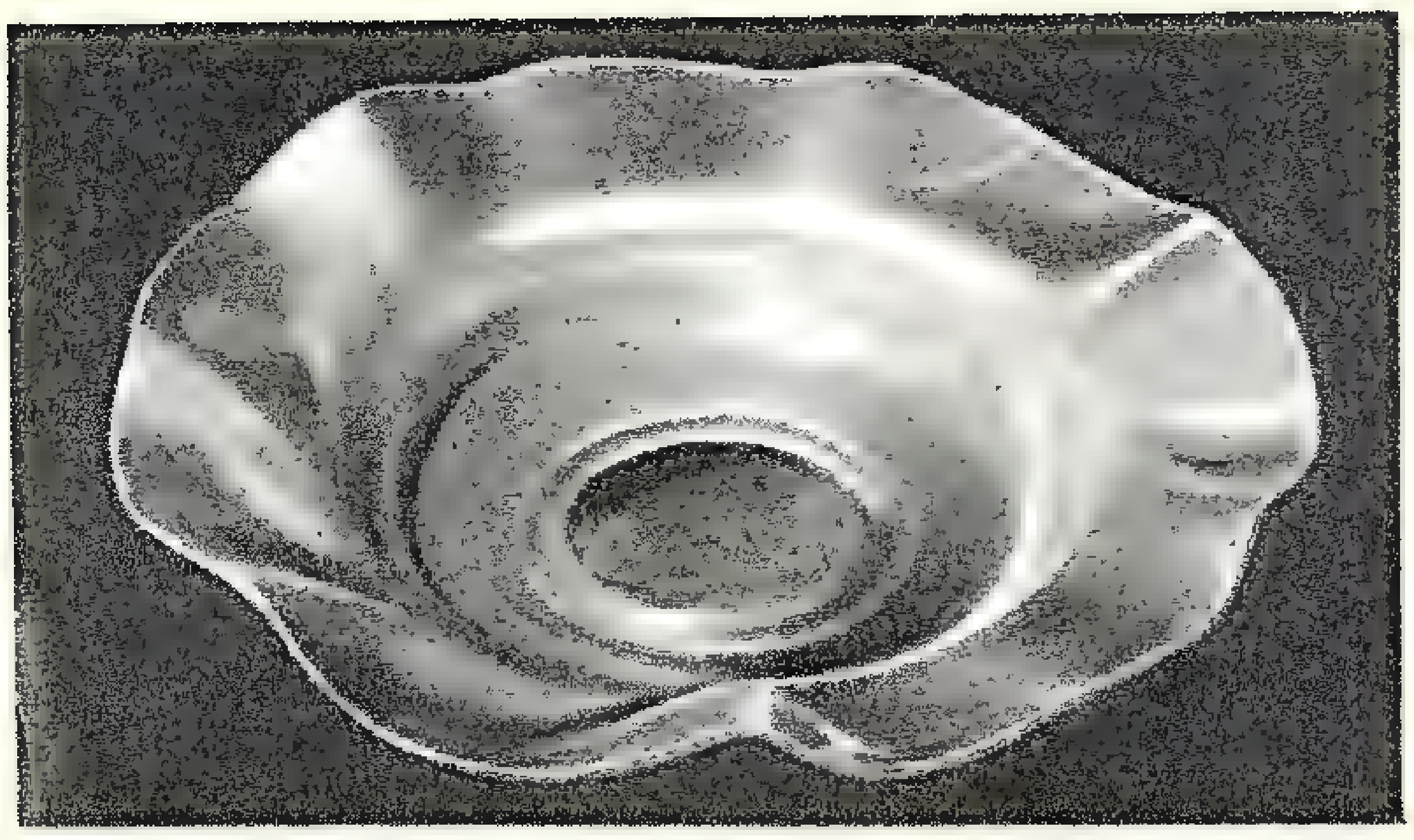
After completing the lead ash tray lining polish it with steel wool until it is the color of pewter. Lock lining in wood bowl.

Access to a metal turning lathe simplifies greatly, the work involved in forming shallow dishes from soft and semi-hard sheet metal. A little coaster of sheet aluminum of considerable thickness was formed in a jiffy in the metal lathe setup. The hardwood block turned to shape, acts as a mold for the coaster. Any round tool can be set in the tool post, then the metal forced to the shape of the mold and later the waste cut off. After forming the piece should be rubbed with coarse steel wool. Rough aluminum or copper pin trays can be made without special rigging in the wood lathe by using a wood mold and letting the edges take whatever shape they wish.

Let's next try a simple, all-metal ash tray which can be made in groups of four for home use or bridge parties. From a wholesale plumbing or hardware concern, get sheet lead having a $\frac{1}{16}$-inch thickness. Turn a soft wood block down in the lathe to 4 inches in diameter. Bend the lead corners over the side of this and tack in place. Start up the lathe and with the round end of a dowel, rub the lead flat against the wood. To reduce friction and heat and to prevent possible cutting of the lead by the dowel, rub the metal surface with a candle stub for lubrication. At high speed, rub this now smooth surface with fine steel wool to give it a good luster. Then wipe with a rag dipped in soda water or vinegar to cut off the grease.

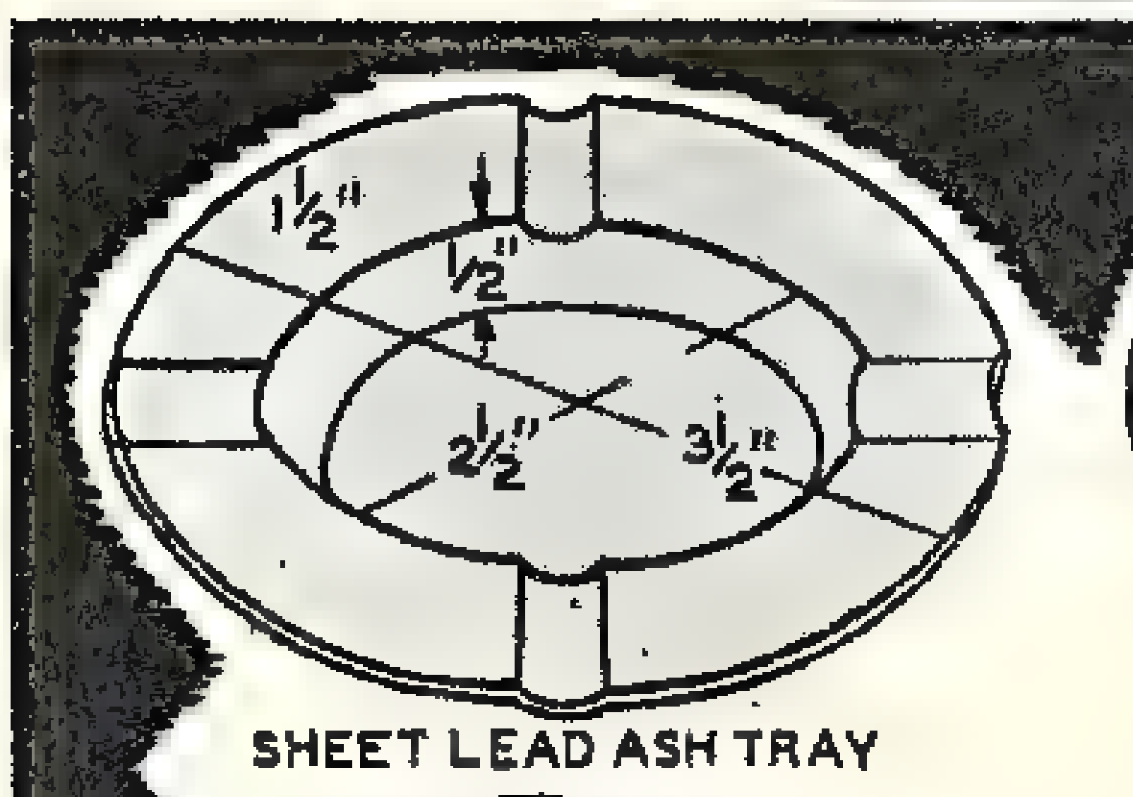
Cut another block of soft wood 3½ inches square and rather thick, then with the drill press, bore a ½-inch hole from each of the four sides to the center of the block. Center this block in the lathe and turn away enough of the right side to expose half of the holes, turn the block round and sand smooth. The lead square is laid over this with the polished side next to the wood and the corners again tacked fast.

Using the dowel again, and the candle stub, the unfinished side of the lead is smoothed and worked into the shape of the wood mold. When the depression has been made, remove the whole unit from the lathe and, laying a

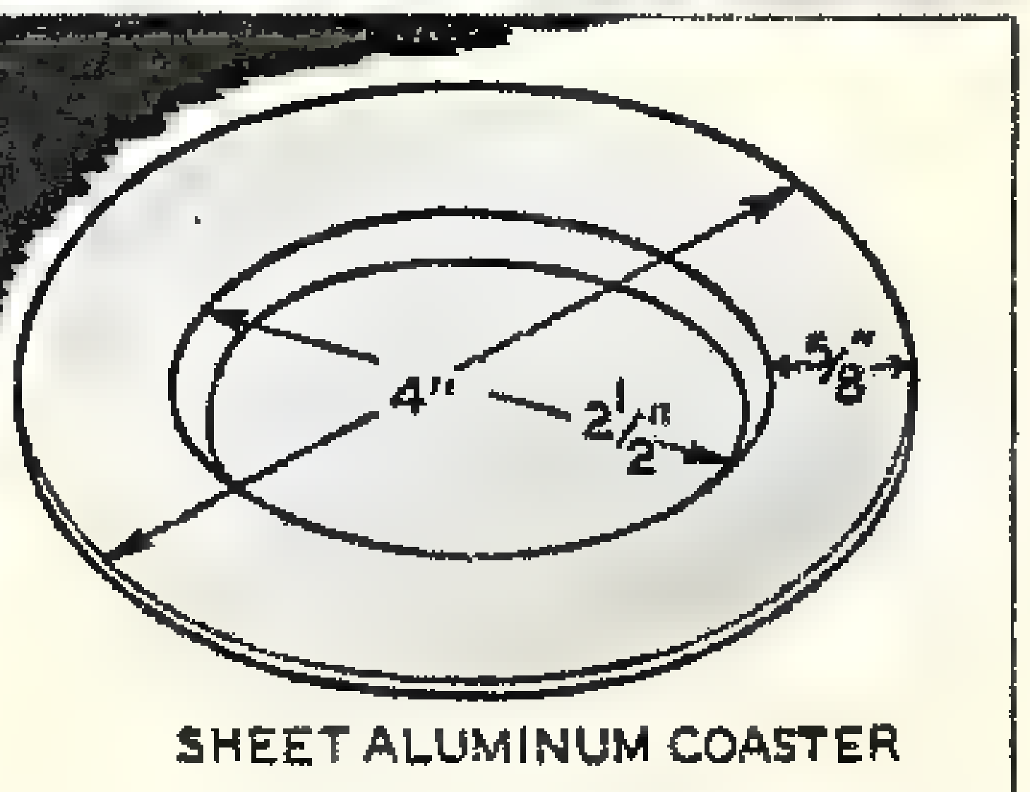


This attractive dish makes a novel pin tray when completed. After successfully completing the aluminum coaster you are ready to advance to this project which is spun from aluminum.

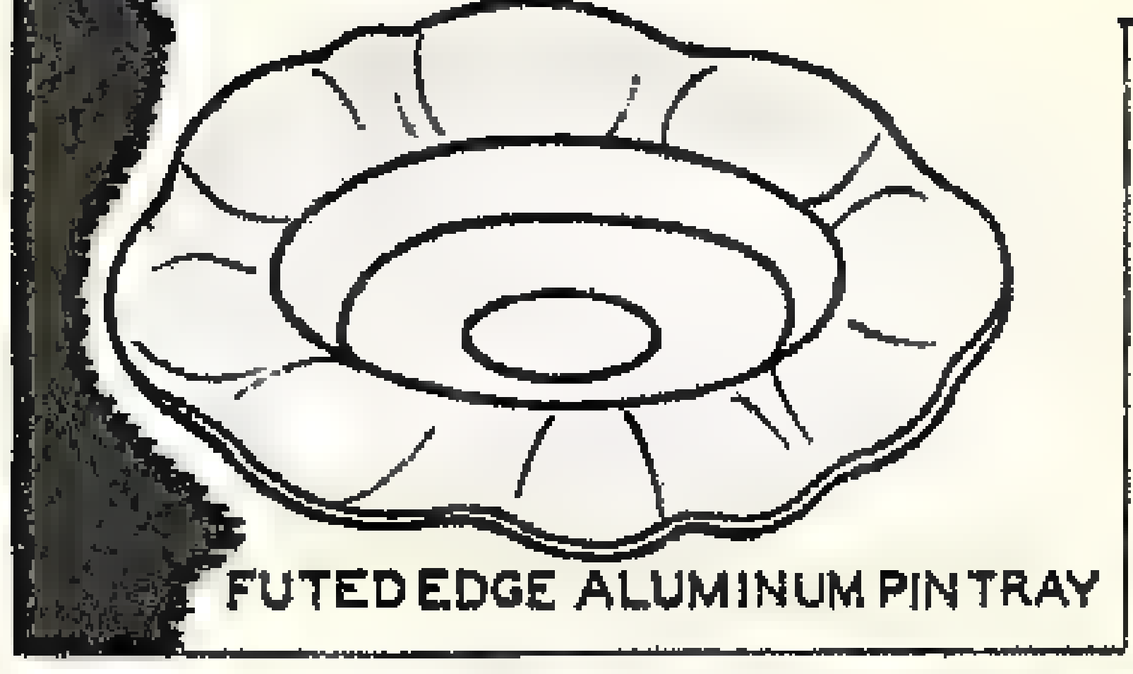
Turned in the same manner as the inlay ash tray this bulb dish makes an attractive decoration for the living room.



SHEET LEAD ASH TRAY

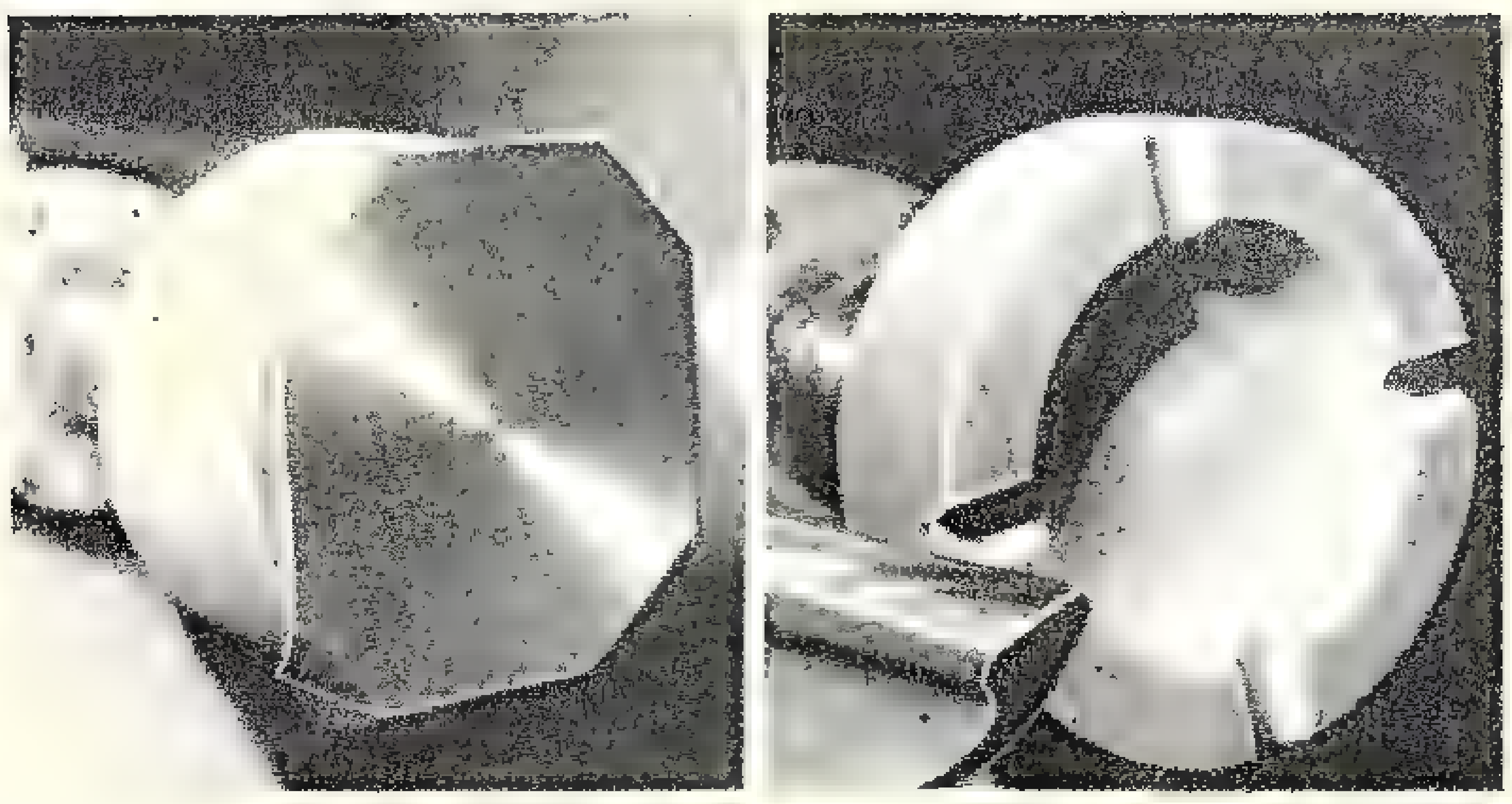


SHEET ALUMINUM COASTER

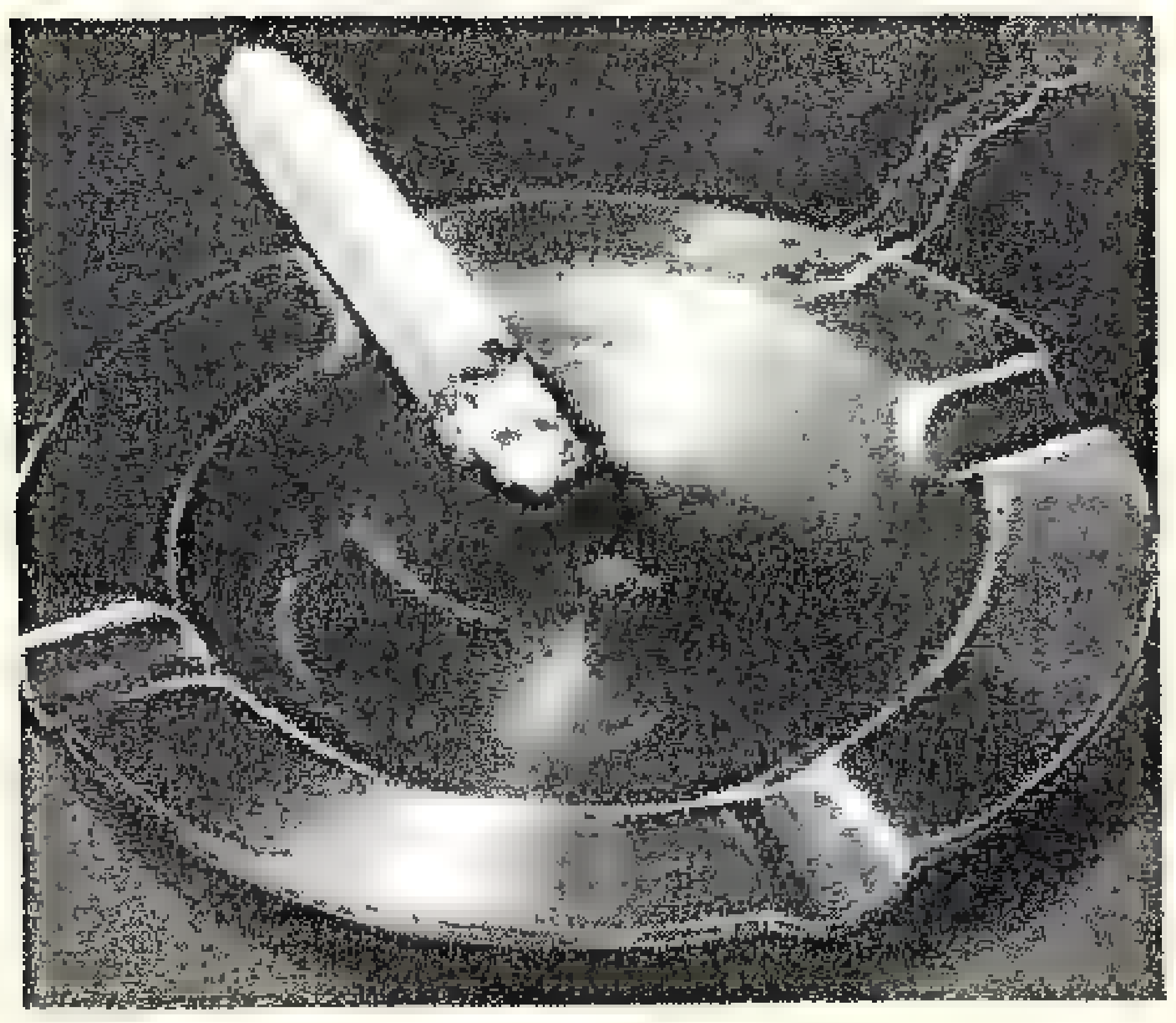


FUTED EDGE ALUMINUM PIN TRAY

Dimensions for aluminum coaster, pin tray and lead ash tray, shown below, are given here. In spinning the articles exercise care during forming operation so as not to tear metal by applying too much pressure.



To spin this lead ash tray first drill ½" holes in a block of thick stock 4" square. Holes are drilled completely through in crosswise fashion. When block is cut cigar grooves result.



Left—The completed lead ash tray as it appears after completion of the turning operation. The form used in spinning was turned from the wood block shown above.

⅜-inch dowel or iron rod squarely over the four grooves, strike sharply with a hammer. The lead is forced down to the shape of the finished tray. Putting back in the lathe will be necessary for polishing with fine steel wool. Finally, the waste is cut off by holding the point of a jack knife on edge, resting on the tool rest, and the lathe turned by hand. This insures a smooth cut-off. Before dipping in lacquer, wipe again with the soda-soaked rag. The finished ash tray is shown in the accompanying illustrations. If a set of four trays are to be made, you can use only one block of wood for the form, smoothing the lower sides of the four sheets, then turning the mold and finishing the four.

A more elaborate ash tray, one which will not need apologies on any office desk, is made in the form of a lovely walnut box with lid, the upper area of which is overlaid with sheet lead to prevent burning. A small hole in the top permits cigarette butts to be dropped inside where they go out almost instantly.

This is turned from two walnut blocks 5½ inches square and about 2 inches thick. One block becomes the lower half, the other the top of the tray. Turn the bottom to the dimensions shown. It will appear as figure 6 shows when completed. Bore a small hole clear through the center of the other block to insure centering, since this is turned first as shown in figure 7, then reversed in the lathe and the top turned to shape so that it will then look as figure 8 shows. Note that a groove is turned for the edge of the lead to lock into and that the surface is lowered about the lead thickness to give a smooth outline later. A lead sheet is cut and centered at the tail stock, rubbed with candle and with a dowel, gradually worked over the top until it fits tightly. With a sharpened dowel, the lead is forced into the groove, the surplus cut away, then sanded and finished.

Note that the lead must be carried over the edge and locked at a point where the diameter is a little less than the maximum diameter over which the lead is laid. This locks the overlay in place and prevents it from working loose or coming off.

Use steel wool, only, on the metal and wipe it with the saturated soda rag. The best way to lacquer the metal is to flow on the liquid, letting the surplus run off. This should be done right side up. When dry, put back in the lathe and buff with steel wool, then polish with a clean cloth. Finally bore a ½-inch hole through the top completing the ash tray.

[*Continued on page* 124]

MICRO-TEST YOUR CAR'S CYLINDER OIL

WHEN the average driver looks at his speedometer and notes that it's time for his regular oil change, he usually wonders whether, after all, his oil really does need changing. Unfortunately, he has no final check other than the word of the service station attendant.

The result is that his oil is often changed long before it is necessary or it is left in the crankcase far too long.

There is a simple, sure method of *seeing* just what the condition of your oil is. All the equipment necessary for this experiment is a few strips of blotting paper and an inexpensive microscope. A microscope which has a magnification of twenty-five diameters is sufficient.

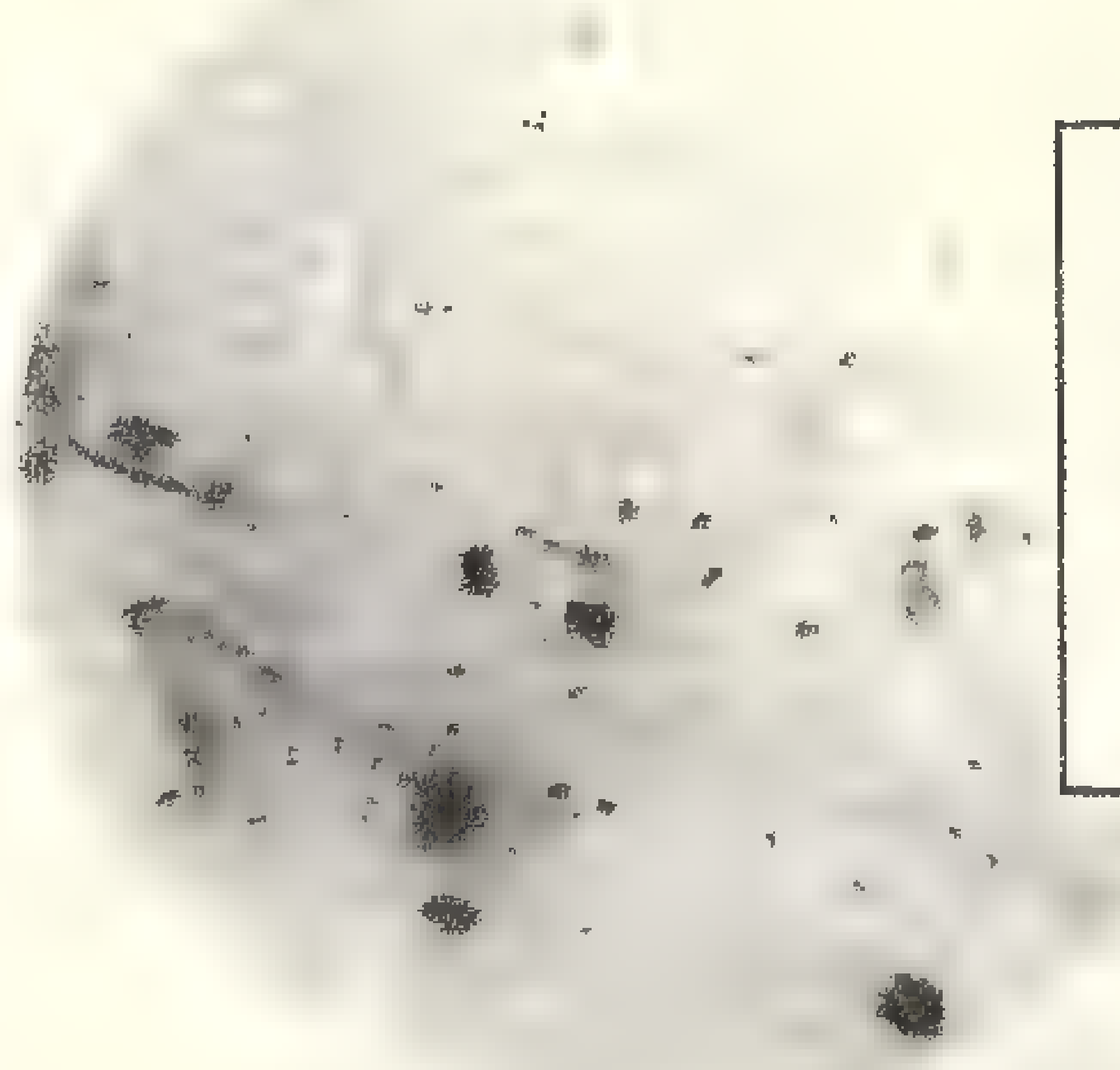
The idea is to convert the microscope into a semi-dark field instrument. This is done by substituting a strip of white blotting paper, about 1x3 inches, for the conventional glass slide.

The movable mirror is not used for directing the light, the lighting comes from above the object being examined. An ordinary gooseneck lamp will serve very well as a source of illumination.

Remove a drop of oil from the crankcase. Place it on a strip of blotting paper and note how rapidly it spreads. This is a good test of the amount of gasoline dilution. Now place the strip in the microscope, and adjust the light so it strikes the paper and reflects into the microscope.

As the oil sinks into the blotting paper it leaves the carbon and metal fragments on the surface. The strong side lighting brings these into sharp relief. The metal particles gleam, while the carbon shows a dull black. A good check on the amount of carbon in the head and on the valves may be made in this manner.

Checking the amount of foreign matter in automobile cylinders requires only an inexpensive microscope set up as shown here.

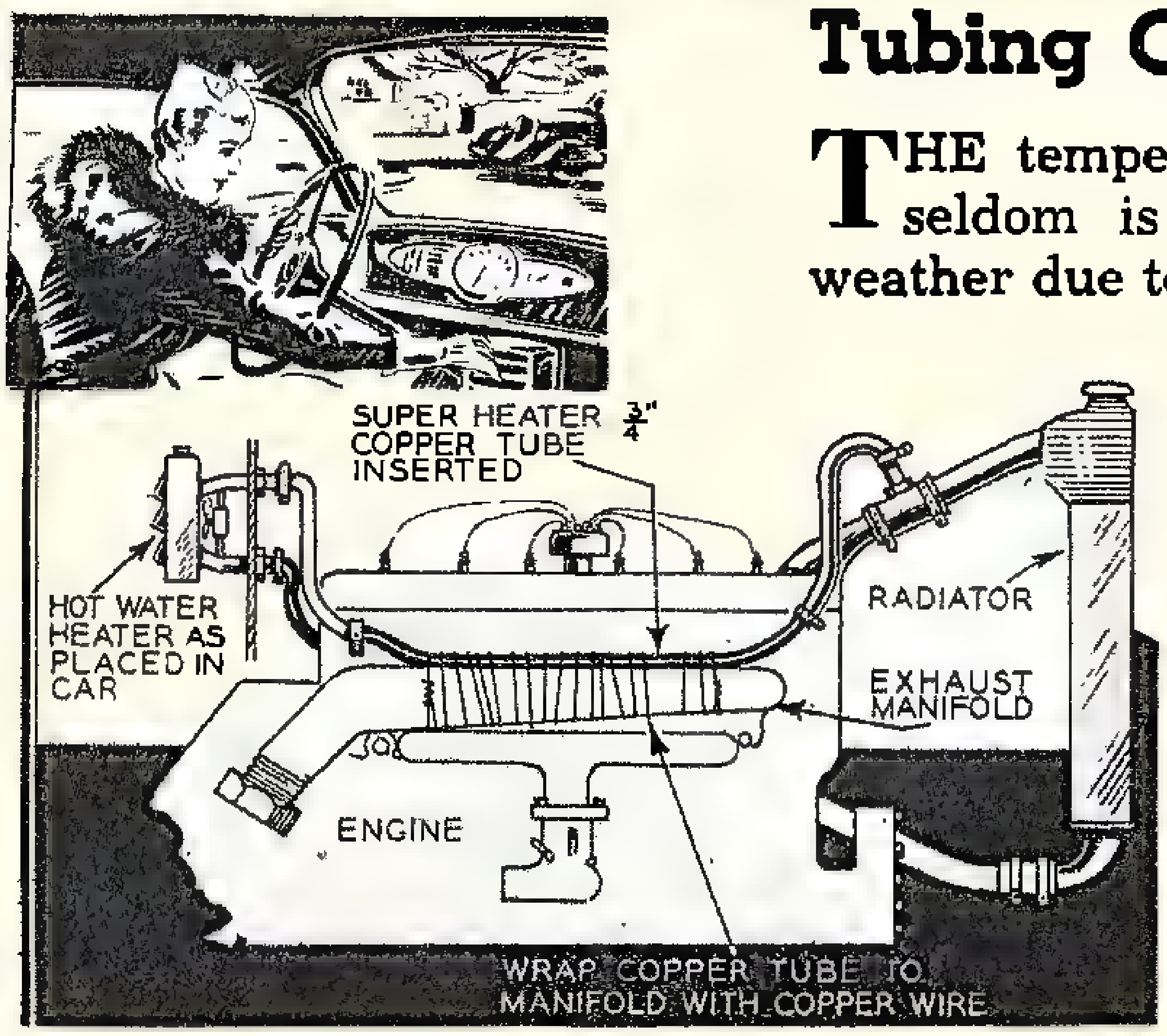


Right—Oil saturated blotter before oil had been placed in crankcase. Top picture shows particles of foreign matter in oil after used.

Samples of oil for making this interesting test can be removed from any car simply by pulling out the oil level gauge and applying a drop of oil to a piece of white blotting paper. Oil containing impurities will sparkle.

TIPS FOR MODERN MOTORISTS

Tubing On Manifold Helps Car Heater

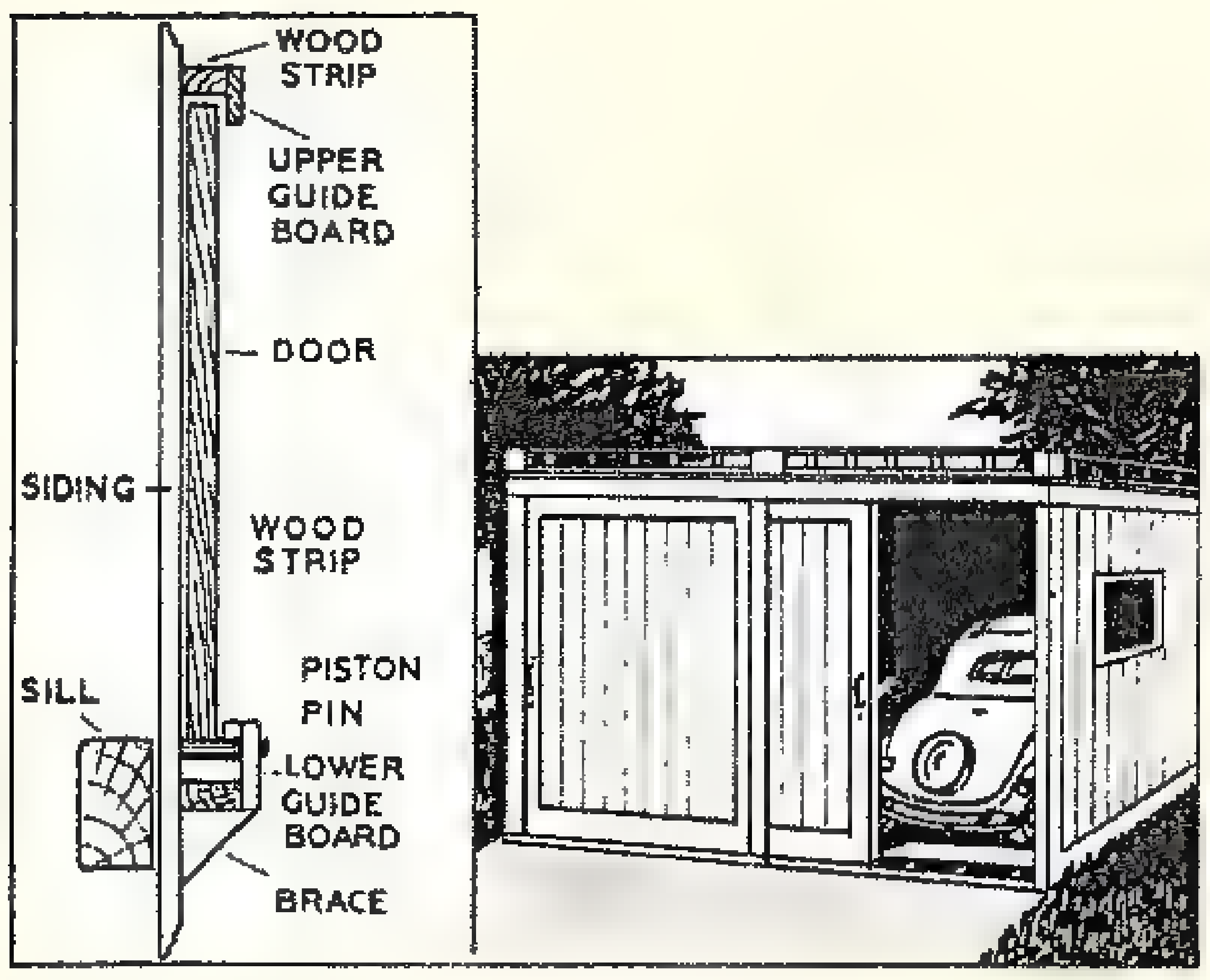

SUPER HEATER 3/4" COPPER TUBE INSERTED
HOT WATER HEATER AS PLACED IN CAR
RADIATOR
EXHAUST MANIFOLD
ENGINE
WRAP COPPER TUBE TO MANIFOLD WITH COPPER WIRE

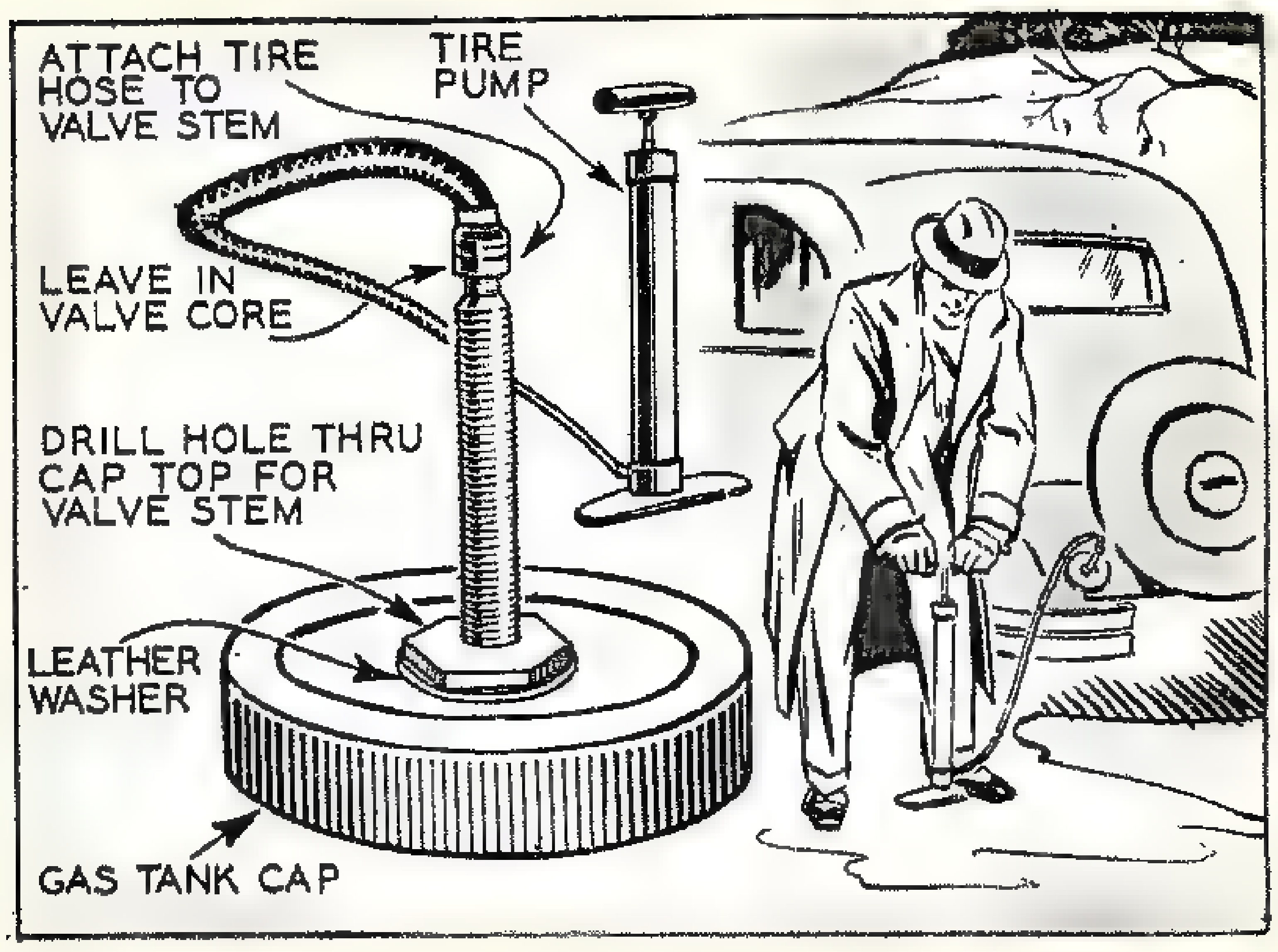
THE temperature of the average automobile heater very seldom is sufficiently high for driving in cold winter weather due to the amount of hot water tubing exposed to the cold blast of air produced by the momentum of the car and the fan.

The temperature of the average hot water heater can be raised considerably by replacing the original tube that connects to the radiator coupling hose with a length of copper tubing. Fasten the copper tubing to the manifold with copper wire wrapping a layer of asbestos paper over both if you desire the maximum amount of heat.—William Tatina, Chicago, Illinois.

Piston Pin Makes Garage Door Roller

PISTON pins which have been taken from a salvaged car make good rollers for use on garage doors. The doors are mounted between guide strips with the piston pins fastened in place with large lag screws. Where the garage is provided with a concrete floor the rollers may be installed in a track in the garage floor so as not to interfere with the car's entering and leaving. The rollers will provide easy garage door operation.—Curtis Wilson, San Antonio, Texas.


WOOD STRIP
UPPER GUIDE BOARD
DOOR
SIDING
WOOD STRIP
SILL
PISTON PIN
LOWER GUIDE BOARD
BRACE

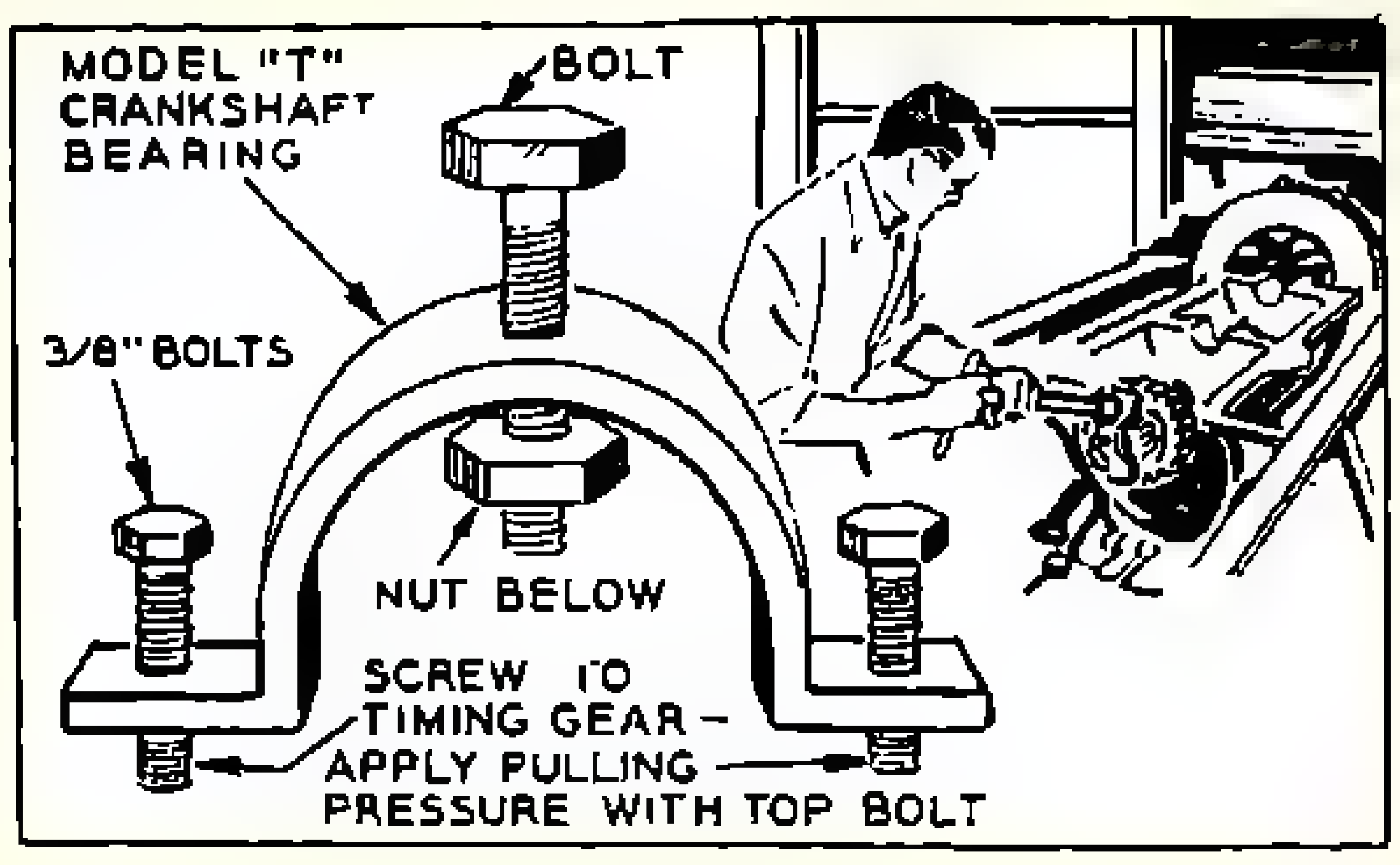

ATTACH TIRE HOSE TO VALVE STEM
TIRE PUMP
LEAVE IN VALVE CORE
DRILL HOLE THRU CAP TOP FOR VALVE STEM
LEATHER WASHER
GAS TANK CAP

Valve Aids Winter Starting

MUCH of the disagreeable trouble experienced in starting a car in cold weather can be eliminated with a replacement gas tank cap and an old inner tube valve and stem insert. Drill a hole large enough to pass the valve stem and then attach the cap to the gas tank. Connect a hand pump to the stem giving it about a dozen strokes with both choke and throttle controls pulled out to maximum. Now step on the starter, allow the motor to make a few revolutions, and push in the choke.—Q. G. Biegert, Junction City, Kan.

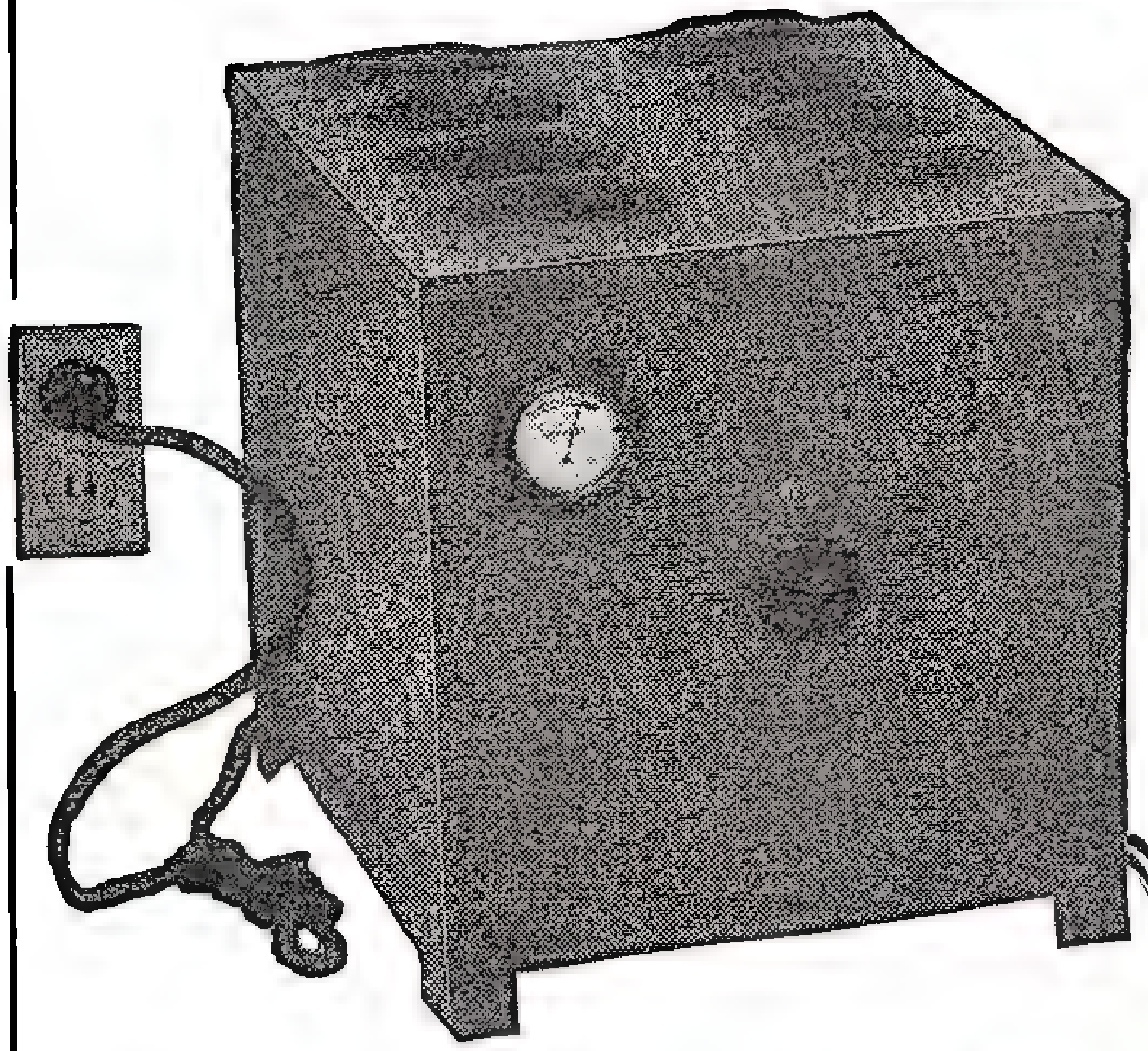
Wheel Puller Made Of Old Bearing

BY DRILLING a hole through the center of the cap of a model T connecting rod bearing and inserting a bolt and nut as illustrated a strong timing gear puller can be constructed. Lodge 3/8-inch bolts in the gears through the outer holes of the bearing and apply the necessary pressure.—A. G. Kociyan, San Leandro, Calif.


MODEL "T" CRANKSHAFT BEARING
BOLT
3/8" BOLTS
NUT BELOW
SCREW TO TIMING GEAR – APPLY PULLING PRESSURE WITH TOP BOLT

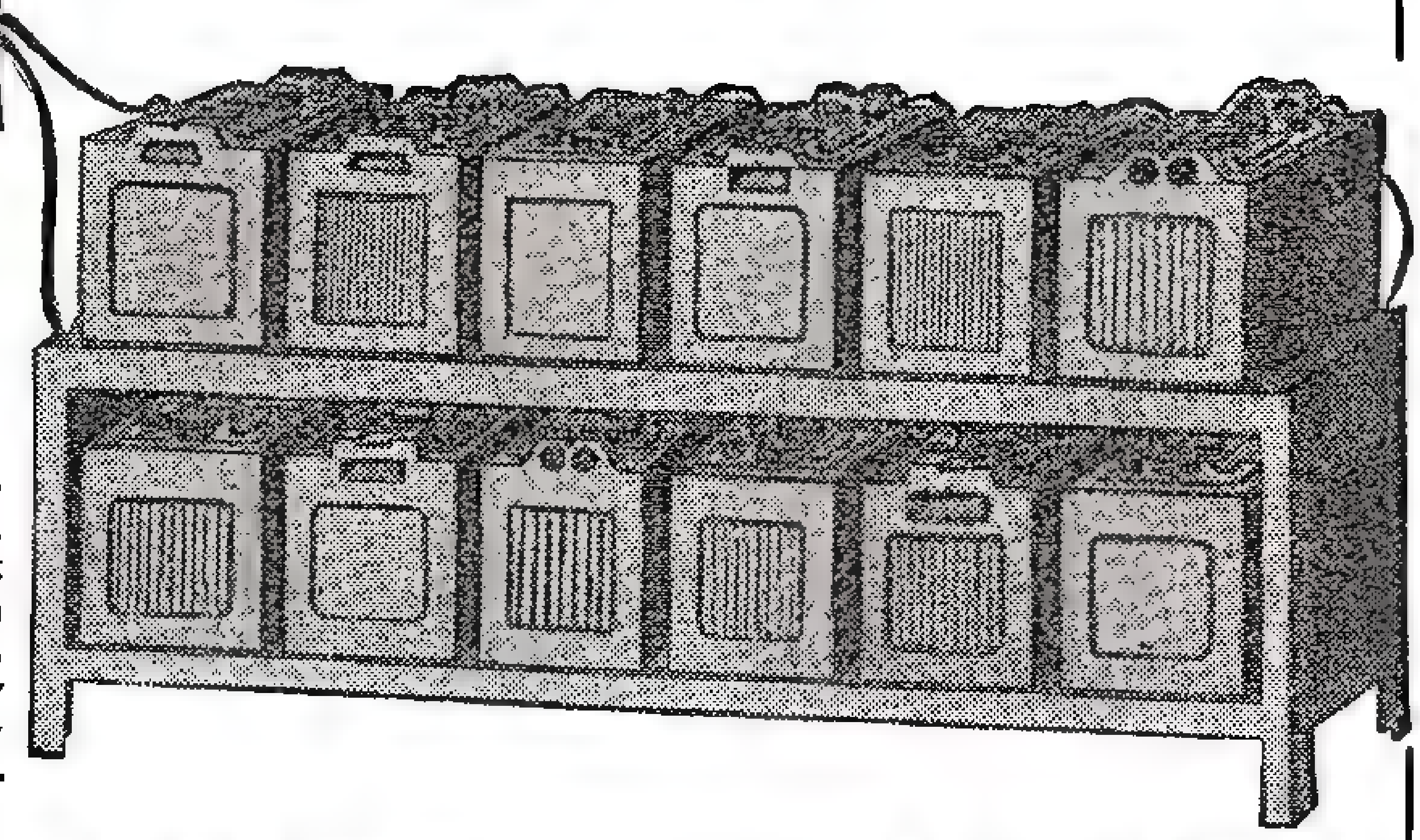
12 Battery CHARGER Only $19.75

Sturdily constructed Battery Charger will give years of trouble-free service —now CHARGE BATTERIES and make the enormous profits this business pays.



Make Money DAY and NIGHT!

Yes, it's true! A big, professional, 12-battery-capacity, 6-ampere charger—FULLY GUARANTEED—only $19.75—only HALF the cost of old-fashioned chargers. The WONDER CHARGER, at many dollars less than the cost of any other 12-battery-capacity charger on the market, brings YOU and every garage, filling station, repair shop, tire and accessory shop an opportunity to make the BIG PROFITS of battery-charging service. More than 40 million autos, trucks and buses in America need battery-charging service regularly. Don't turn this business away. Install the WONDER CHARGER at only a fraction of the cost of old-style, high-priced equipment at once!

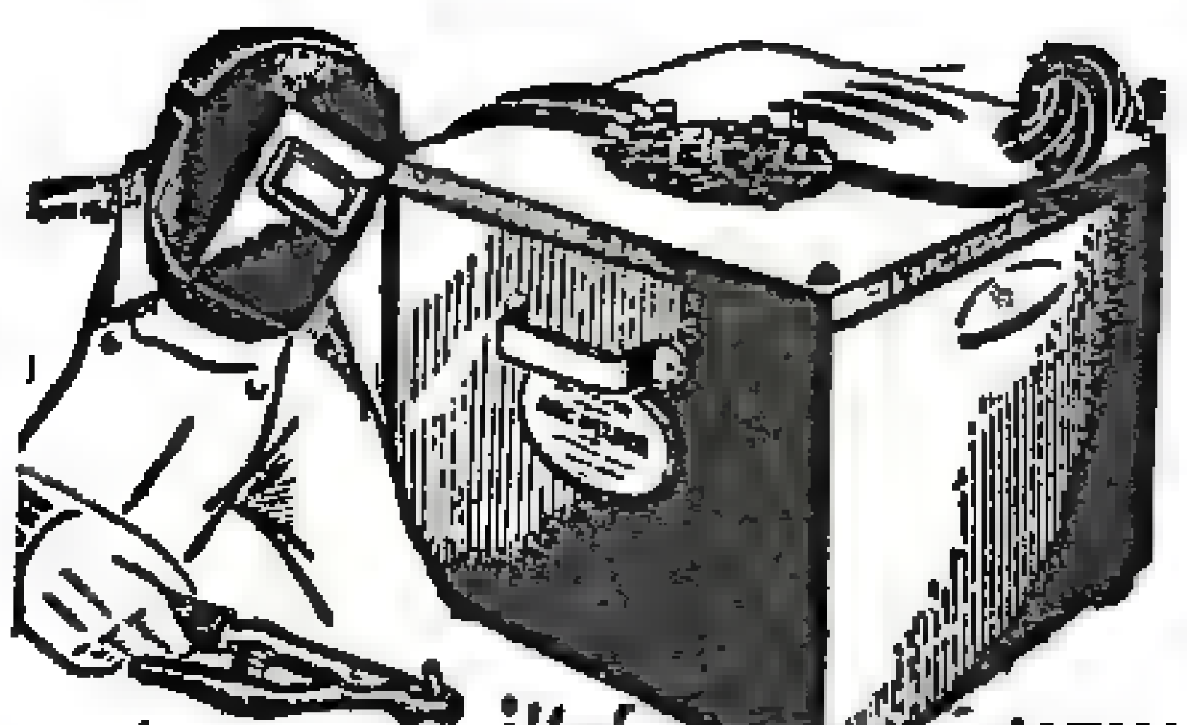


Every Battery Means 75c to $1.50 for You

Battery-charging service is almost ALL PROFIT! Because it requires a minimum of time, labor and attention from employees, it costs little in operating power, yet *brings you cash profits as high as 800%!* Now you can stop sending customers and their money to competitors. Now you can keep these big *profits*—hundreds of steady extra dollars every year—*right in your own shop!* Day and night, Saturdays, Sundays and holidays, too, WONDER CHARGER works away, making big, easy profits for you. Helps you give customers the service and satisfaction that builds good will and a growing, profitable business. Mail the Coupon for details NOW.

RUSH Coupon For FREE FACTS

The WONDER Battery Charger is a big, sturdy, welded-steel-construction machine. Greatest charging efficiency at lowest power cost. Operates from ordinary light socket, 110-Volts to 125 Volts, 50 or 60 cycle. Measures 11" by 11" by 12½". Weighs 35 pounds complete. Takes small space—brings BIG PROFITS. Completely charges up to 12 batteries in 18 hours—PROFIT of up to $8.00 a DAY. Has accurate ammeter and embodies every feature of higher priced charger for long, dependable, trouble-free service. Should pay for itself first week! Mail the Coupon for sensational facts.

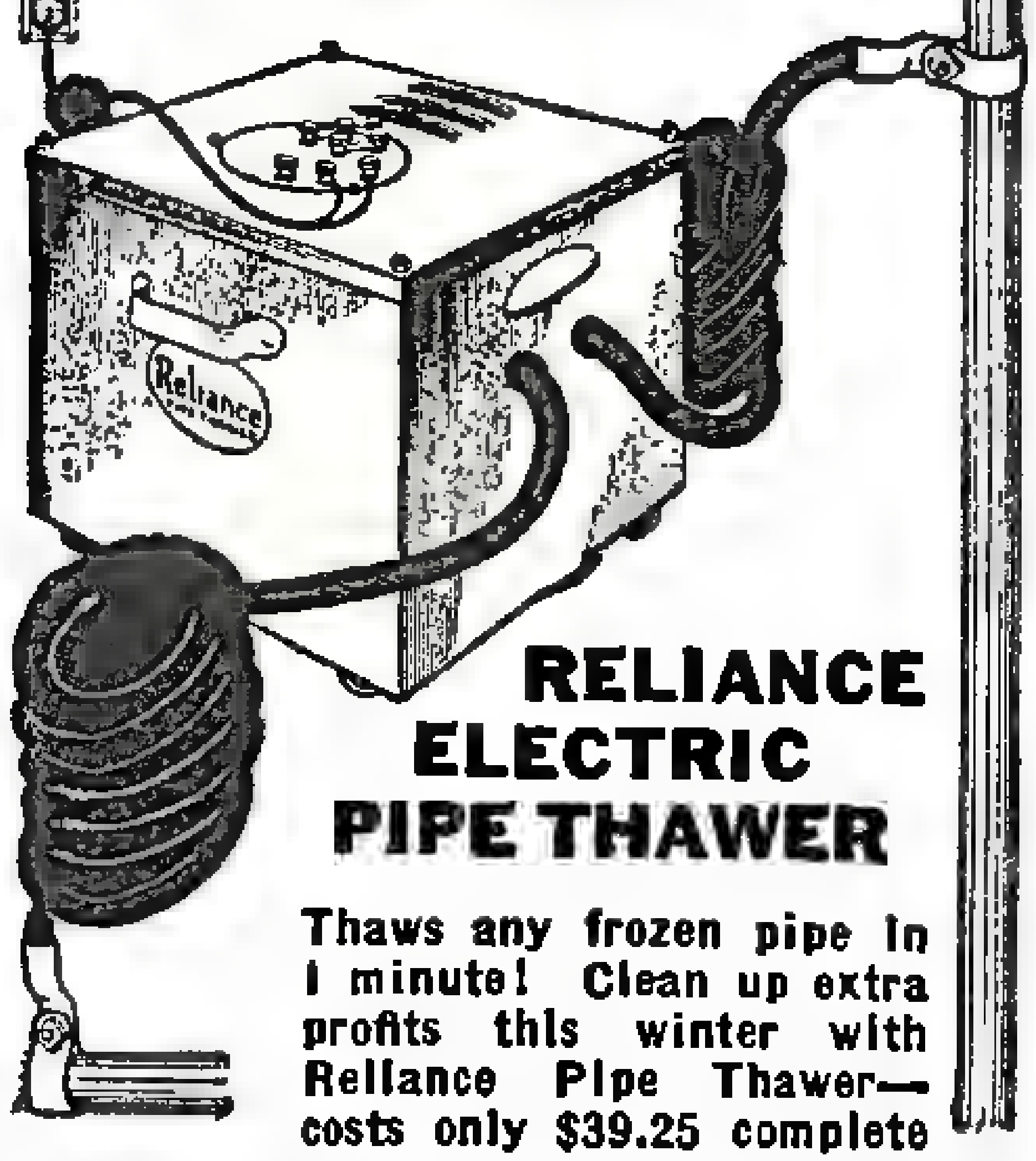


NEW ELECTRIC ARC WELDER

$39.25 Complete with Accessories

Now easy to add hundreds of dollars to your profits. With Aladdin Electric Arc Welder, you can do all types of heavy and light welding; motor blocks, fenders, axles, frames, bodies, gears, bumpers, etc. Works from 110 or 220 Volt Socket. Costs only few pennies an hour to operate. Experience not needed. Check coupon for FULL DETAILS.

EXTRA PROFITS!



RELIANCE ELECTRIC PIPE THAWER

Thaws any frozen pipe in 1 minute! Clean up extra profits this winter with Reliance Pipe Thawer—costs only $39.25 complete—does work of machines costing up to $3,000. Make $2.50 to $15.00 a job. Check coupon for details.

COMMONWEALTH MFG. CORP.
3785 Beechmont Ave., Dept. P-206, Cincinnati, Ohio

COMMONWEALTH MFG. CORP.,
Dept. P-206, Cincinnati, Ohio

Please rush details of WONDER BATTERY CHARGER, without obligation. Also for machines checked below:

☐ ELECTRIC ARC WELDER
☐ PIPE THAWING MACHINE

Name ....

Address ....

City ....State ....

AMATEUR PHOTO PUZZLERS

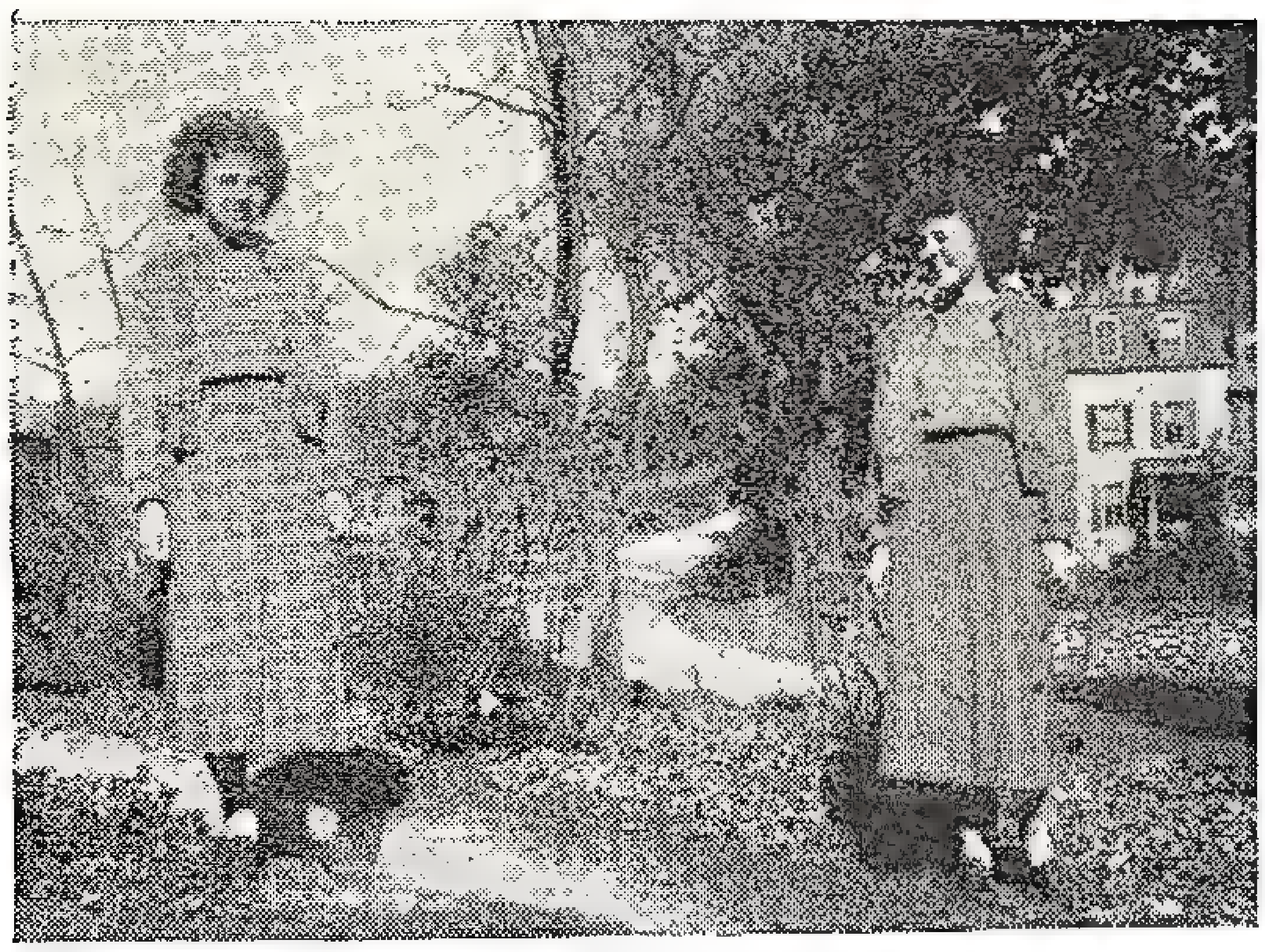
In this department the Photography Editor will answer any question or problem related to cameras of all types, enlarging, printing, developing, taking pictures, and the various phases of home movie making. When sending questions to this department, be sure to include a stamped, addressed envelope in case space does not permit publication of the question and reply on this page. Send all inquiries to the Photography Editor, Modern Mechanix Hobbies & Inventions Magazine, *22 West Putnam Avenue, Greenwich, Connecticut.*

MAKING A COPY OF SNAPSHOT PRINT

I have a small snapshot picture which I treasure very highly. I would like to secure an enlargement of this picture, but since I no longer have the negative I have been in doubt about the possibility of this. Since I know very little about photography I am wondering if you can enlighten me on this matter. —Grace Cook, Dover, Delaware.

Good enlargements up to 8 by 10 inches can be secured from small snapshot prints simply by photographing the snapshot on a fine grain film and enlarging this film to the particular size desired. Any photographer can do this work for you. The cost is nominal.

TRICK PHOTO RECEIVES $5 AWARD



By exposing one half of the film at a time with a "duplicator" Harvey Herdman, Branchville, N. J., secured this unusual picture. The girls are not twins, but one and the same person. For his clever photography Mr. Herdman receives $5.00.

ACTION PICTURES WITH BOX CAMERA

Is it possible to take action pictures with a box camera? Last month I attempted to take pictures of some of the exciting plays during our school's football season, but the results were very disappointing. What kind of camera should be used for taking action pictures?—David Rendown, Philadelphia, Penna.

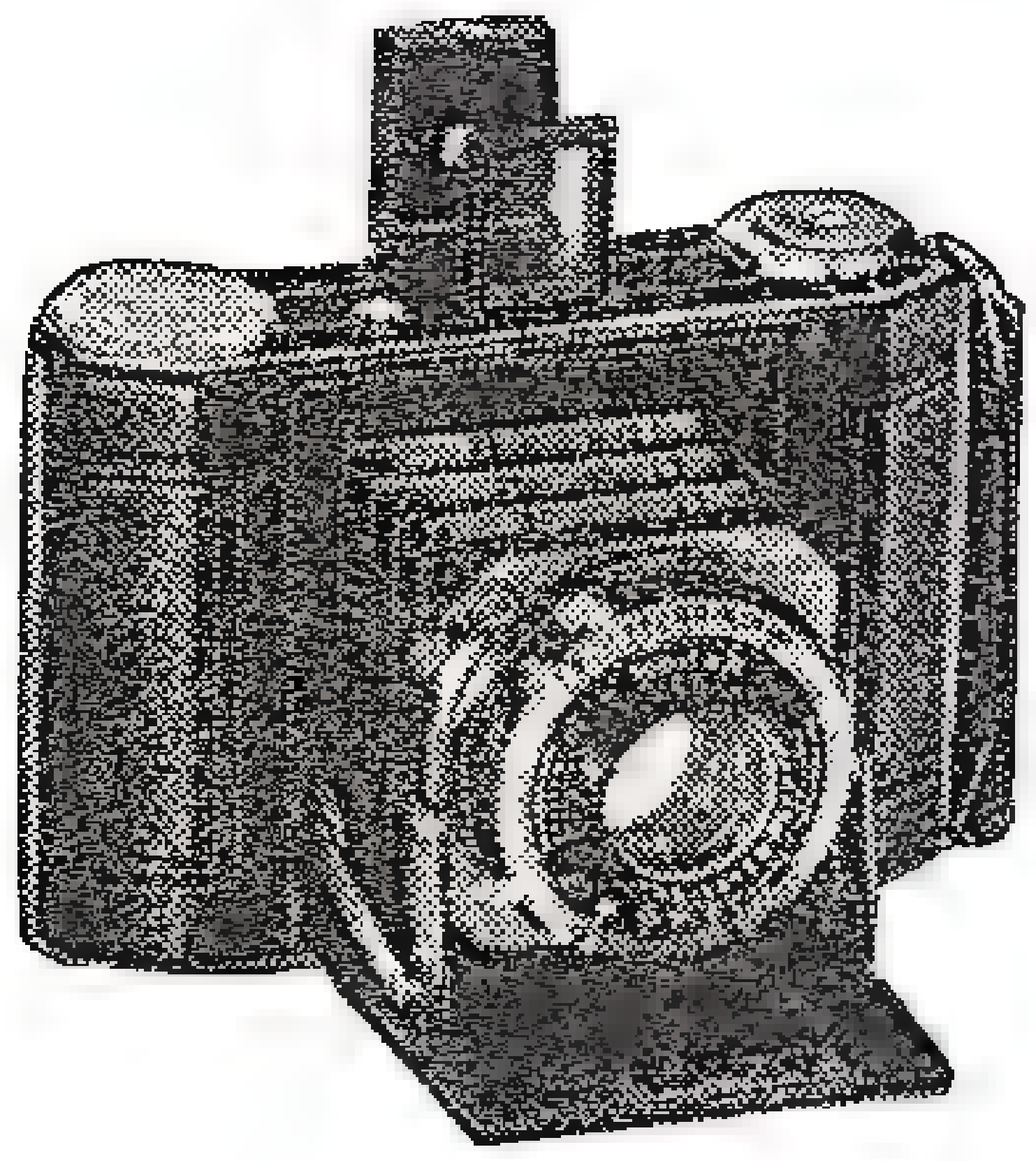
Action pictures cannot be taken with a box camera since it is fitted with a lens that is entirely too slow for the purpose. Action pictures, if they are to be clear, must be taken with a camera having a f.2 or faster lens. The usual box camera lens is an f.8 which is, as you can well see, too slow for recording action scenes.

The photograph editor will pay $5.00 *or* $3.00 *each for photographs interesting enough for publication on this page. All pictures should be mailed to Modern Mechanix Publishing Co., Greenwich, Conn.*

Kodak

FOR THOSE WHO LIKE THEM SMALL

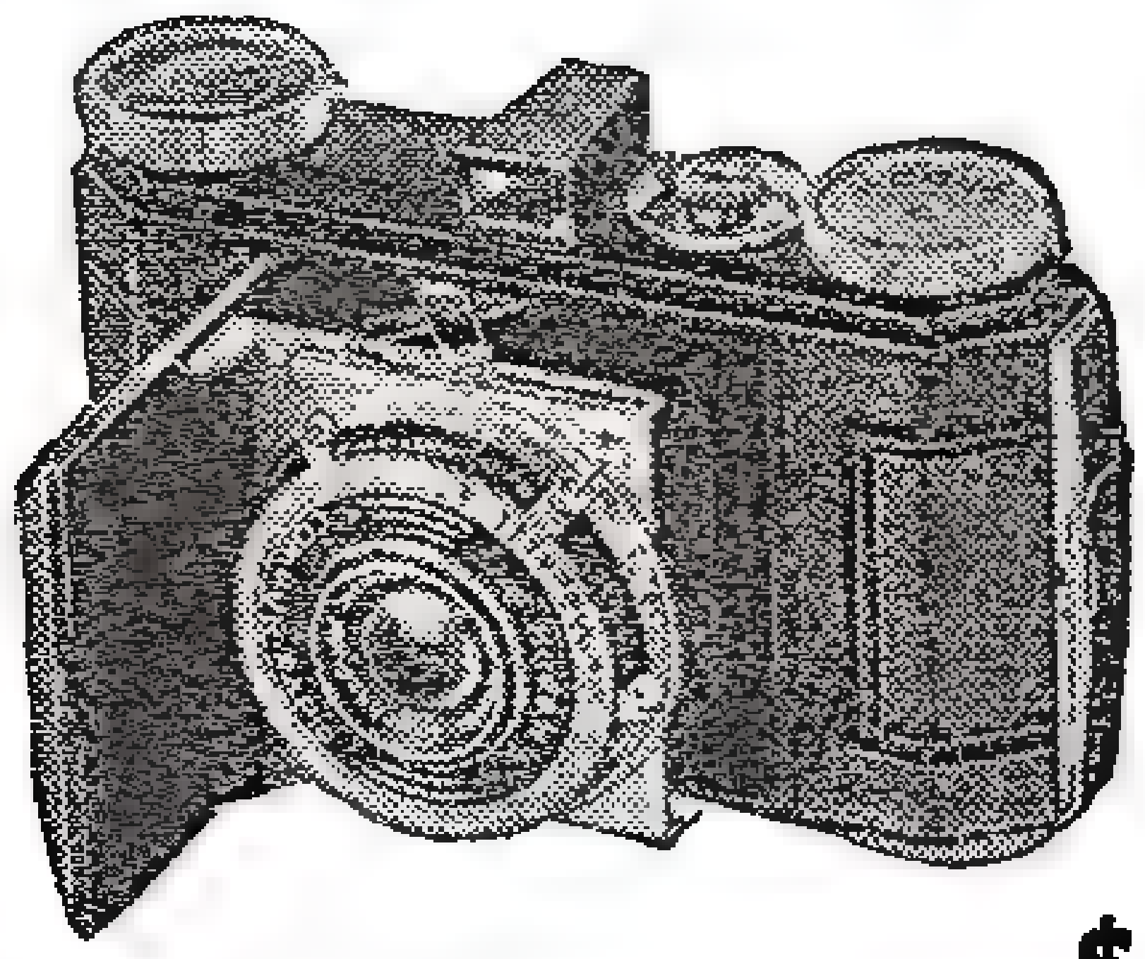
☆ Miniature Kodaks



$5750

KODAK DUO SIX-20

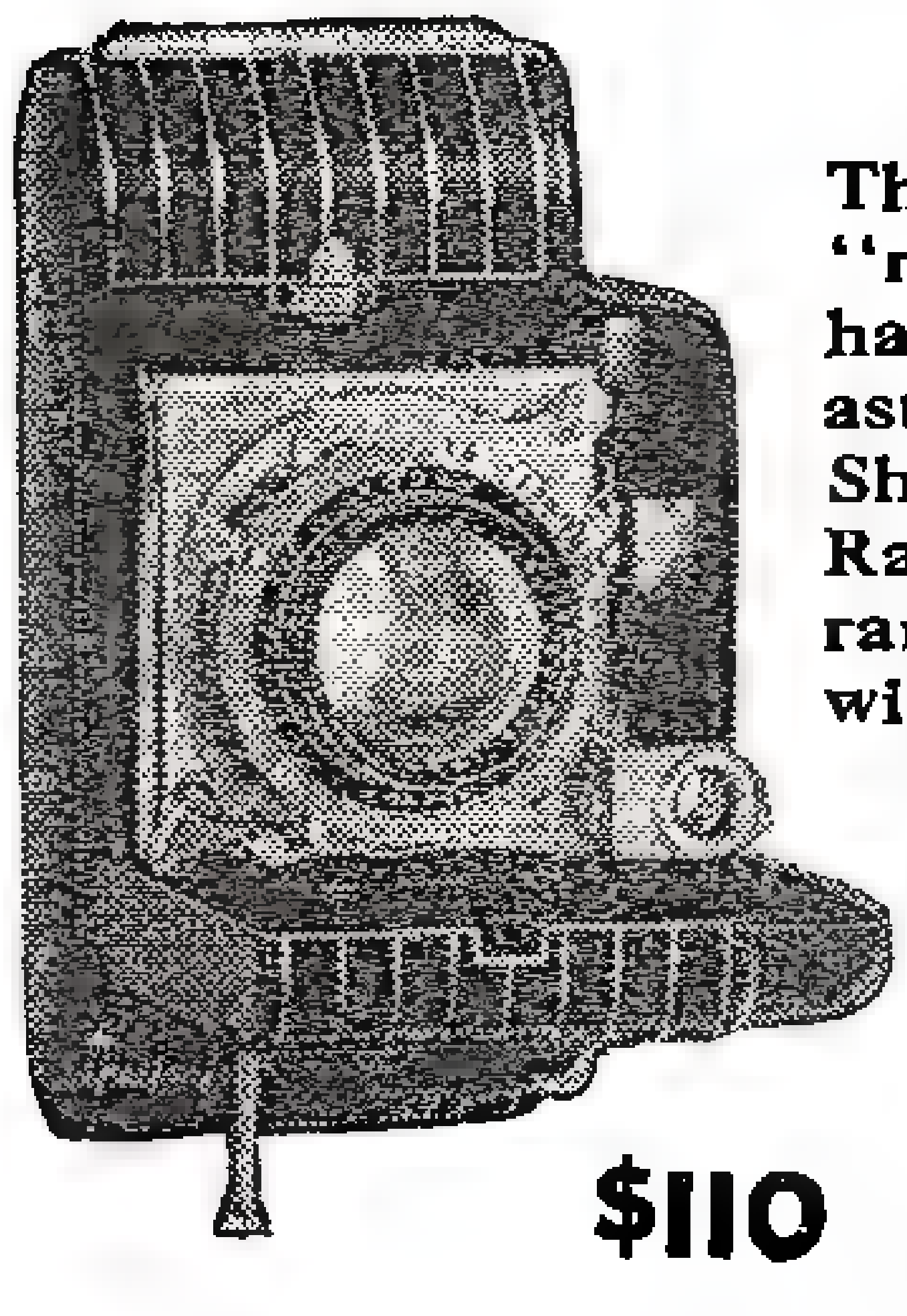
A true "miniature"; compact, finely built, yet it takes 16 album-size pictures (1⅝ x 2¼ inches) on a roll of Kodak Film (four types available). Negatives are sharp; give big, clear enlargements. Shutter, 1/500 Compur-Rapid. Lens, Kodak Anastigmat ƒ.3.5. Price, $57.50.



KODAK RETINA $5750

Concentrated photographic versatility . . . lens, anastigmat ƒ.3.5; shutter, Compur-Rapid—9 speeds up to 1/500 second. Loads with any of five different Kodak Film Magazines (including new Kodachrome for full-color transparencies). Negative size approximately 1 x 1½ inches. Price, $57.50.

KODAK BANTAM SPECIAL



This exquisitely made "miniature" fits the hand. Lens, Kodak Anastigmat EKTAR ƒ.2.0. Shutter, 1/500 Compur-Rapid. Military-type range finder, coupled with focusing mechanism. Makes needle-sharp negatives for superb enlargements (low-cost size, 2¼ x 4 inches); or Kodachrome transparencies. Price, $110.

$110

Christmas Guide

FOR THOSE WHO LIKE THEM LARGER

Precision Kodaks

KODAK SIX-16 (f.4.5)

Smallest folding camera taking 2½ x 4¼-inch pictures. *F*.4.5 lens; 1/400 Compur-Rapid shutter. Price, $40. (With *f*.6.3 lens, $20; with Doublet lens, $16.)

$40

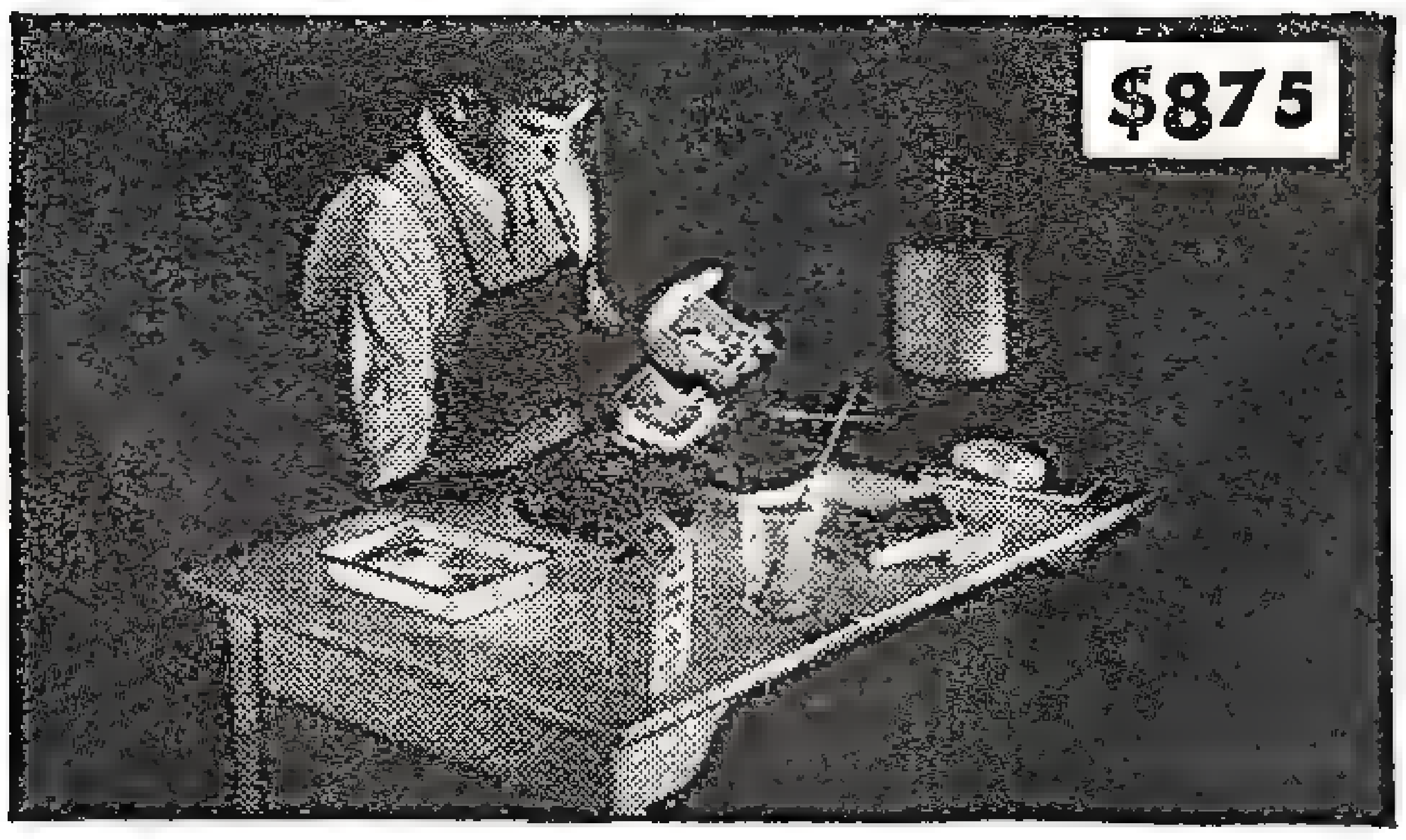
KODAK RECOMAR 18

Advanced amateurs delight in its *f*.4.5 lens, 1/250 Compur shutter, self timer, ground-glass focusing back. Loads with film packs, cut film, plates. 2¼ x 3¼. Price, $54.

$54

KODAK DARKROOM OUTFIT NO. I

Contains trays, chemicals, developing clips, safelight, printing frame, thermometer, instruction booklet—everything necessary for first-class work. Also includes the book, "How to Make Good Pictures." Price, complete, $8.75.



$875

FOR THOSE WHO WANT MOTION

Ciné-Kodaks

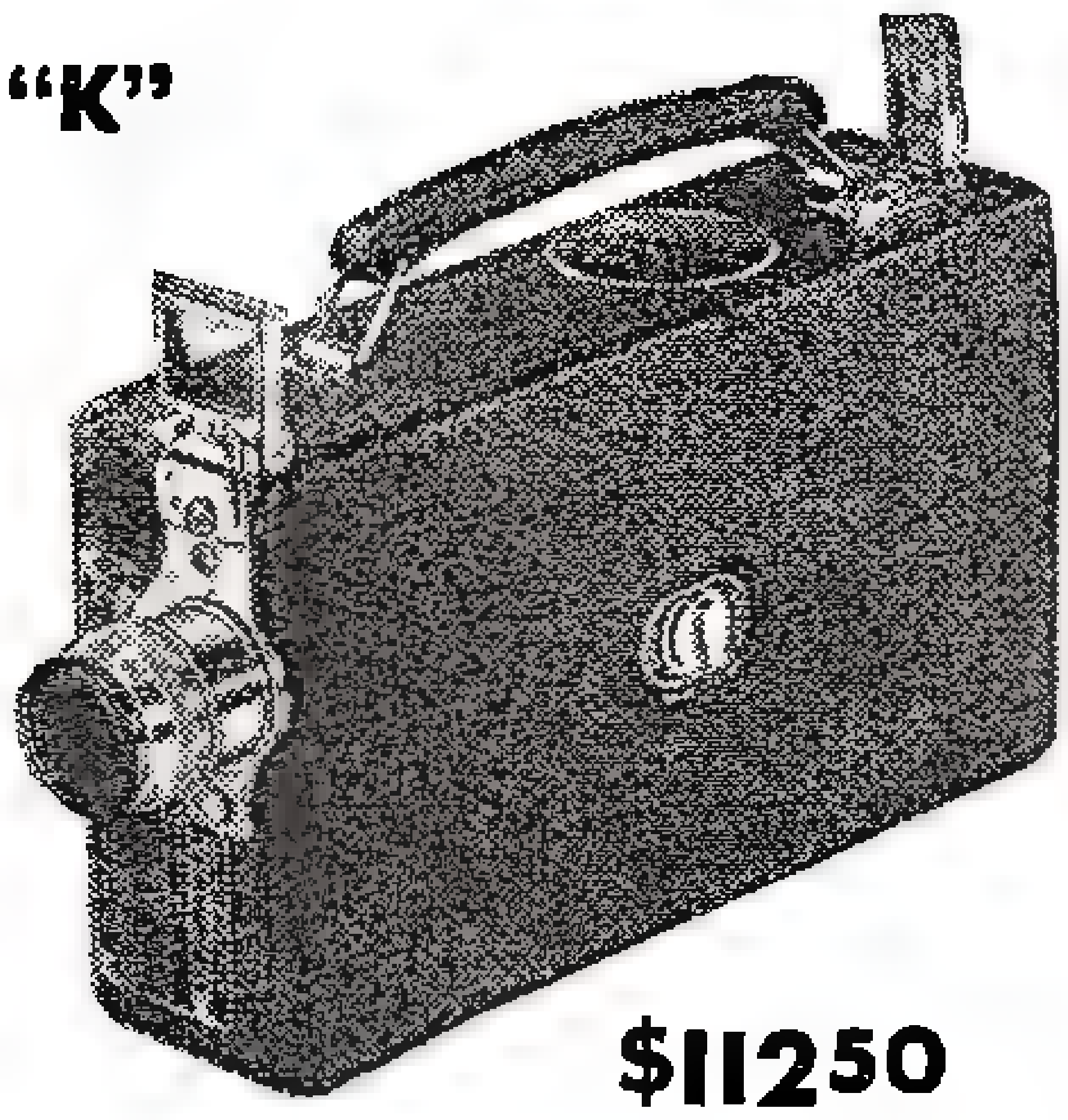
CINÉ-KODAK EIGHT

Movies at "10 cents a shot"! The "Eight" makes it possible. A roll of Ciné-Kodak Eight Panchromatic Film costs only $2.25, *finished, ready to show*. Good for 20 to 30 black-and-white movie "shots," each as long as the average scene in the newsreels. Price, $34.50.

$3450

CINÉ-KODAK "K"

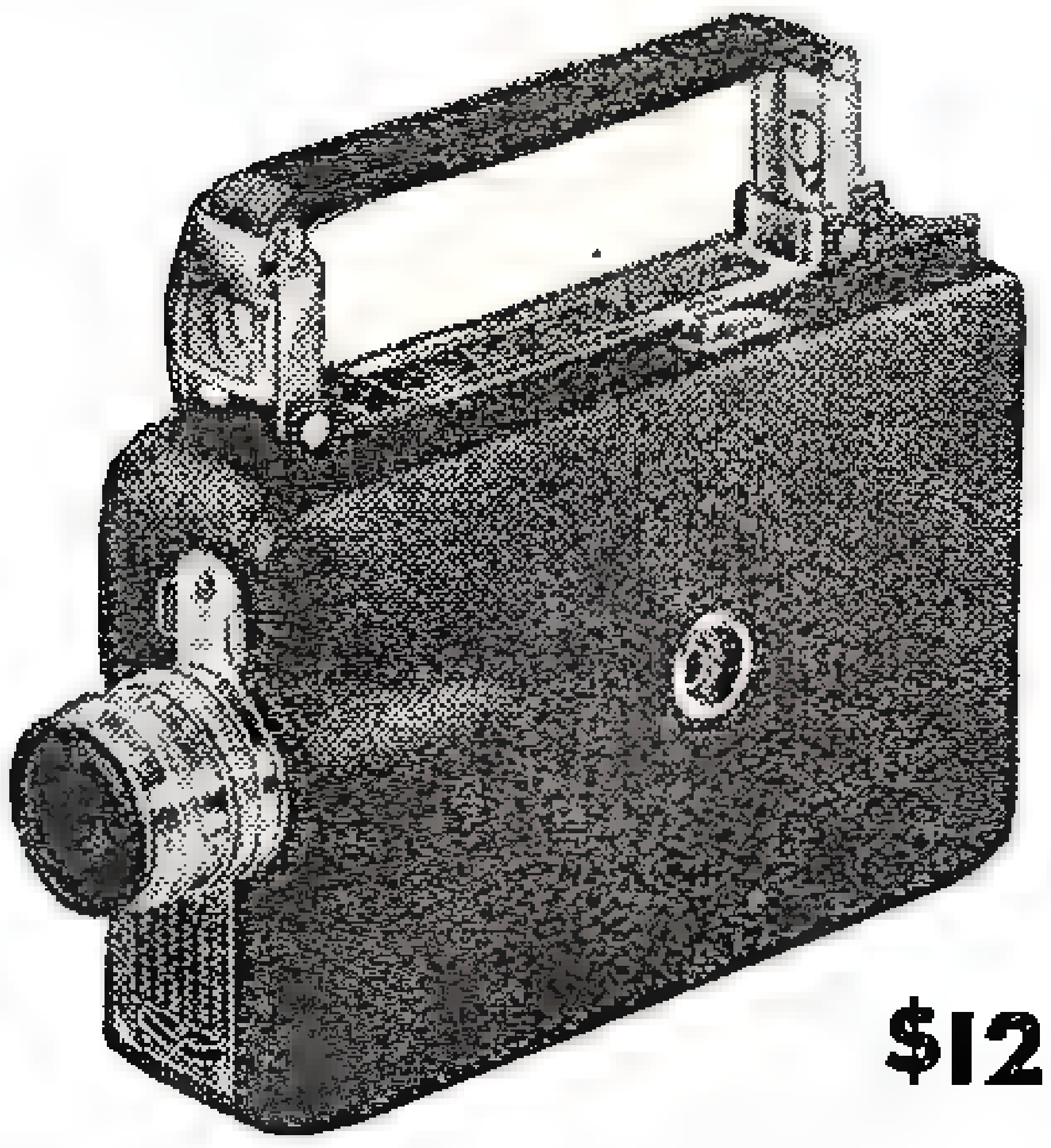
Most widely used 16 mm. home movie camera—it's so simple, yet so fine. Makes clear, brilliant movies at the touch of a button. And as the user's skill increases, responds to every exacting demand. Loads with full 100 feet of 16 mm. film. With *f*.1.9 lens, $112.50.



$11250

MAGAZINE CINÉ-KODAK

Loads in 3 seconds. Slip in the magazine, close camera cover, and shoot. And you can switch to another film in a jiffy, even when but part of the 16 mm. film has been exposed. Effortless loading is only one of six new features. With *f*.1.9 lens, $125... Eastman Kodak Company, Rochester, N. Y.



$125

ALL CINÉ-KODAKS MAKE FULL-COLOR MOVIES ON KODACHROME FILM

Behind The Razor Blade

[*Continued from page* 61]

breakdown. The dies these men produce are accurate to one ten-thousandth of an inch.

After perforating, the blade strip is gauged for centrality—a measurement from the center slot to either edge. This distance must be held constant. The importance of accuracy here can scarcely be over-emphasized, since centrality of the slot controls the proper positioning of the blade in the razor.

Since the hardening process requires a surface absolutely clean, the coils of steel are "laundered" in the de-greasing machine immediately before entering the hardening furnace. The de-greaser passes the perforated coil through a soda wash, through high pressure jets of water just under the boiling point, through blasts of compressed air, a scrubbing box, a tank of special grease solvents, through jets of live steam, and finally compressed air again.

The razor blade makers were the first to recognize the fact that steel received from the rolling mill cannot be uniform, even in a single coil, and that to produce a uniform finished product, the temperature of the hardening furnace must fluctuate to compensate for these variations.

Since the furnaces maintain a temperature of approximately 1500 degrees Fahrenheit, and the difference between a good and a bad blade can be affected by a change of only 10 or 12 degrees, the control for the hardening furnace must be extremely sensitive and entirely automatic.

A "magic black box," situated midway of each furnace, furnishes this automatic control. A master strip of steel of exactly the correct temper is inserted in this box. If the steel in process does not match this master strip exactly in hardness, the magic box flashes an impulse to a control panel regulating a battery of automatic switches, and the amount of electricity flowing to the furnace is altered the required amount to bring the steel to the desired standard.

It is in the hardening furnace that the distinctive blue effect of a blade is obtained. A patented apparatus feeds a special mixture of gases to the furnaces, and the blue becomes part of the steel itself.

As the strip of steel leaves the hardening furnace it passes through the tempering plates that make the center section easy to flex when the blade is placed in the razor. A coat of rustproofing oil is then applied before the coil is rewound.

Samples are broken off of each coil after it leaves the furnace, to be submitted to a hardness test under a diamond-pointed instrument. If a sample fails to meet the required standard the whole coil is rejected and the furnace is stopped until the trouble can be found and remedied.

These samples are then sent to the cathode ray oscillograph—the electro-magnetic tester previ-

NOW LISTEN, LARRY —YOU CAN'T BACK OUT!
NEXT DAY
TAKE IT FROM ME, LARRY—THESE YEAST CAKES ARE SLICK STUFF TO FINISH OFF PIMPLES—JUST YOU START EATING 'EM RIGHT OFF!
GEE CHARLIE—YOU SURE ARE ONE SWELL GUY!
LATER
HEY CHARLIE—TAKE A SQUINT AT MY FACE—THAT FLEISCHMANN'S YEAST WORKED
WELL I TOLD YOU IT WOULD CHASE THOSE BLOSSOMS—DIDN'T I ?

ously described. Variations of hardness and temper, or any hidden flaws or strains, are revealed here by a green line of light flashing on the fluorescent face of the oscillograph cathode ray tube. So accurate is this device that the passing of a sample through the flame of a match will cause a variation of hardness great enough to bring about a rejection. Next is a bending test to make sure the center of the blade will flex in the razor.

Having passed these tests, the coil of steel, now perforated, hardened and tempered, is run through a series of delicate gauges, to again determine that the breadth, thickness and centering are uniform.

The approved steel is again passed through the "laundry," after which it goes to the etching machines, where the trade mark and other distinctive lettering are etched on the metal with acid.

After another examination, the coil is sent to the sharpening machine. Two sets of grinding wheels, one for each edge, first remove the rough stock. Next the honing wheels, cutting at a different angle from the grinders, produce a perfect bevel on each edge.

After being honed, the blades are washed clean and dried with compressed air before passing on to the stroppers of specially tanned leather. Each blade is finished on 280 feet of sharpening surface while passing through this machine.

Inspectors stationed at the ends of the finishing machines submit their blades to tests with microscopes and gauges, finishing the test by cutting hair with the blades.

Samples from the finishers are also sent continually to the laboratory for examination by a photo-electric sharpness comparator. This machine measures the area of the blade edge with a beam of light. As the light traces down the length of the blade, a dot is thrown on a ground glass.

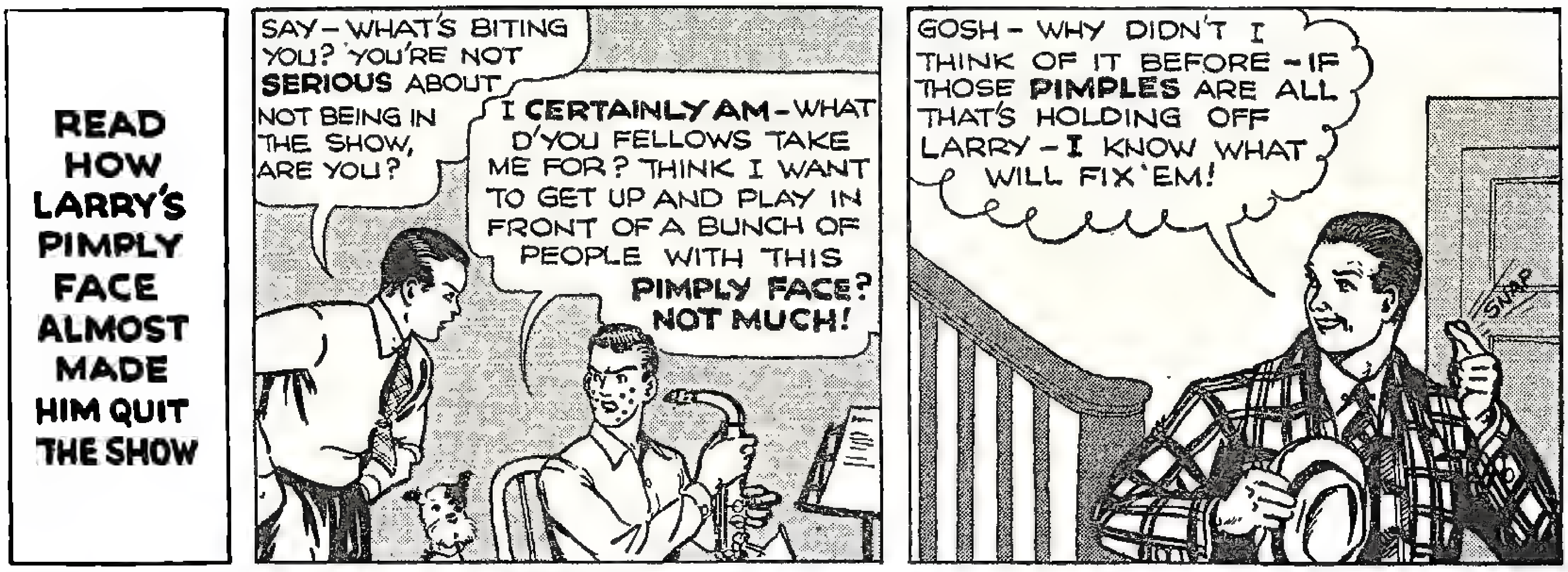
With cross-section paper placed over the glass, a girl traces a graph of the blade's edge. If the graph is straight, or nearly so, the blade is satisfactory. If it is saw-toothed, irregular, something is wrong with the grinding machine. That machine is stopped immediately, and the blades it has finished must be rejected.

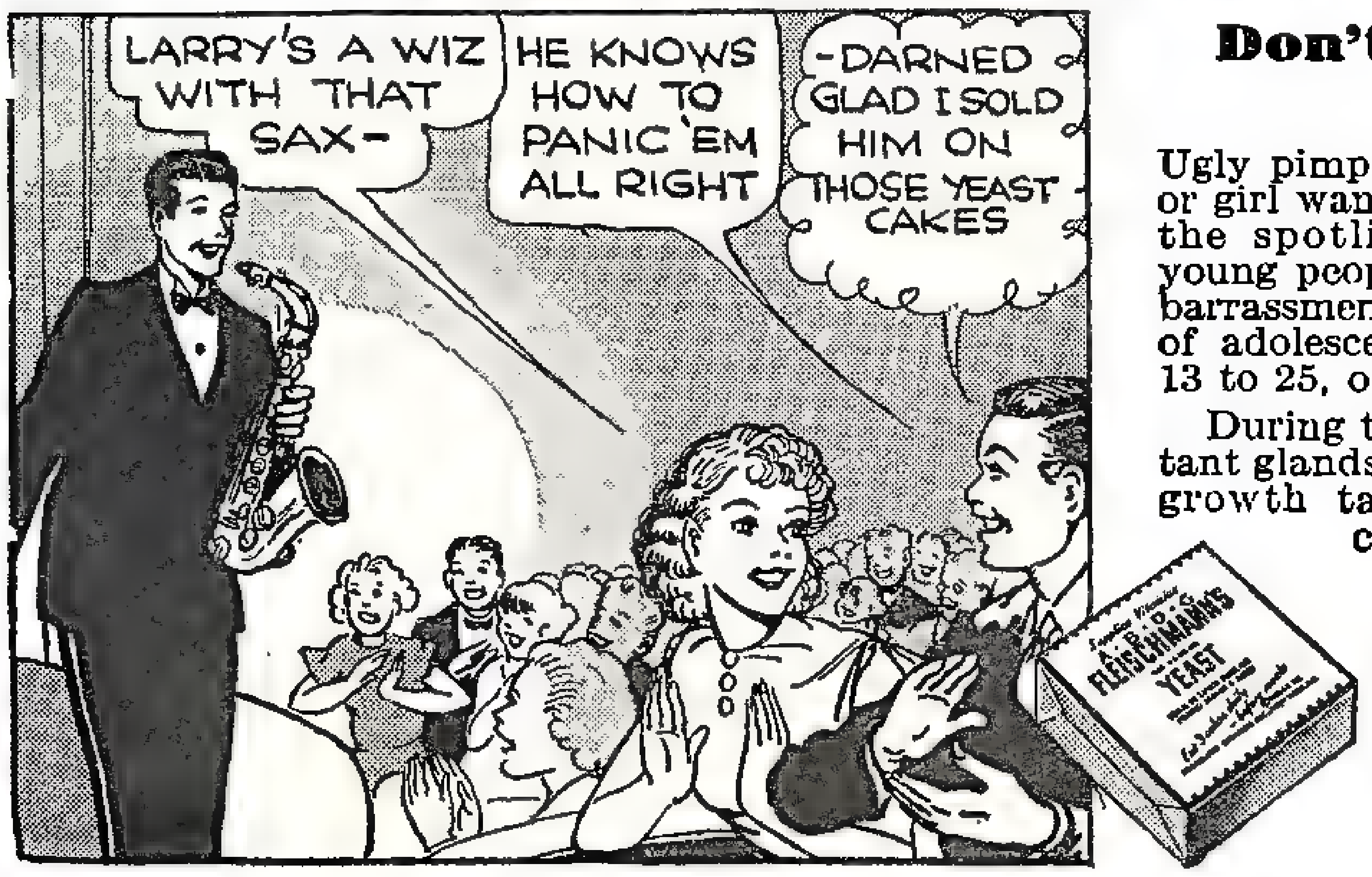
The finished blades now go to a room which at first glance you would take to be a library. Girls are studiously pouring over, not books, but stacks of blades. Every blade that leaves the factory is inspected by these girls.

After passing this last barrier the blades are sprayed with a powerful antiseptic solution, after which they are immediately wrapped, sealed in a wax-paper envelope and an outside wrapper.

In an endeavor to improve its product the Gillette Company has several inventors on salary, constantly working on new developments for the razor and blade.

And all so you won't wear whiskers.


READ HOW LARRY'S PIMPLY FACE ALMOST MADE HIM QUIT THE SHOW
SAY-WHAT'S BITING YOU? YOU'RE NOT SERIOUS ABOUT NOT BEING IN THE SHOW, ARE YOU?
I CERTAINLY AM-WHAT D'YOU FELLOWS TAKE ME FOR? THINK I WANT TO GET UP AND PLAY IN FRONT OF A BUNCH OF PEOPLE WITH THIS PIMPLY FACE? NOT MUCH!
GOSH-WHY DIDN'T I THINK OF IT BEFORE-IF THOSE PIMPLES ARE ALL THAT'S HOLDING OFF LARRY-I KNOW WHAT WILL FIX'EM!
SNAP


LARRY'S A WIZ WITH THAT SAX-
HE KNOWS HOW TO PANIC'EM ALL RIGHT
-DARNED GLAD I SOLD HIM ON THOSE YEAST-CAKES
FLEISCHMANN'S YEAST

Don't let Adolescent Pimples keep YOU from being a hit

Ugly pimples make any boy or girl want to steer clear of the spotlight. Yet many young people suffer this embarrassment after the start of adolescence—from about 13 to 25, or even longer.

During this period, important glands develop and final growth takes place. This causes disturbances throughout the system. The skin becomes very sensitive. Waste poisons in the blood irritate this sensitive skin. As a result, pimples appear.

Fleischmann's Yeast clears these skin irritants out of the blood. Then, pimples go. Eat 3 cakes *daily*—one before each meal—plain, or in a little water—until skin clears.

—clears the skin

by clearing skin irritants out of the blood

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TURN SPARE HOURS INTO CASH!

up to $40 Weekly In Your Own Home

No soliciting! No canvassing! We show you how to make big money decorating fast-selling Giftwares. We start you with the big $10 Artist's Outfit shown above. We supply you with $150 worth of Giftwares free of extra charge and show you how to dispose of them without leaving your home. We give you 29 Tested Plans for making money. One Fireside Member says, "I made $100 on furniture in one week." Another writes, "My sales were $500 for 5 weeks. This is my first year." R. M. P., of Ill., says, "I did $3.500 worth of business last year and over $12,000 this year." D. W., New Mexico, reports, "I would not take $1,000 for my Course."

No Experience Needed

You too may have a **guaranteed income** opportunity with Fireside. No tiresome study. You learn by doing. No artistic ability necessary. Our easy 3-Step Method makes the work easy to learn and easy to do and fits you to make good money practically from the start.

Quick Sales in Your Home

No need to leave the house to dispose of everything you make. Our new automatic salesman does all the selling for you. Designed to quickly find cash buyers for all the Giftwares you can turn out.

No Cost Plan

Send coupon for details of new plan that pays for your Fireside Course besides putting big cash profits in your pocket. Mail coupon now while openings for new members are still being offered.

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FREE! Book on decorating at home for big money. Tells how to get big assortment beautiful Giftwares free of extra charge.

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Salt Water Fishing Tackle

[*Continued from page* 78]

jerked on the water surface, boiling up the same in a most tempting fashion. Robalo, sea trout, kingfish, Spanish mackerel and others attack such surface lures with a ferociousness that is little short of spectacular. It is an excellent idea to have a 10-inch gimp wire leader connected to the lure to stall off the possibility of the teeth of the fish connecting with the line.

There seems to be a belief with some that gut leaders are suitable for protection as between the end of the line and the lure. Gut leaders, however thick, should never be used. Steel wire No. 8 to 10 is generally selected from which to cut leaders ranging from three to five feet in length. Bronze wire size .022 is also much in use.

The cuttyhunk type of line is without doubt the favorite in most sea fishing locations on all coasts. These lines are composed of a number of threads, 18, 21, 24, 27, 30 or as the case may be. The 18-thread line contains 18 threads, and so on. The better grade of cuttyhunk line has a dry test of 2½ pounds per thread. According to this the 18-thread line will test to 45 pounds, and the 30 thread line, 75 pounds. It is necessary to know this in selecting your cuttyhunk lines.

Aside from the fact that the black bass casting rod and the plug lures are used in the inshore waters, around the reefs and river mouths, and in such places where the small sized to medium sized fish often hold out, it may be said that the medium sized to the large fish are almost always trolled for. This trolling is carried on at a rather faster rate of speed than that in fresh water.

A method of deep-sea fishing that is much in vogue wherever sea fish are taken is that of still-fishing. This involves anchoring the boat off sunken ships, submerged reefs and rocks, around pilings and old piers, and there contacting the mighty. This is a favorite method of fishing for the jewfish, the tremendous finny one which is likely to go into the hundreds of pounds in weight. For jewfish (also called sea bass by some), it will be found that a hand-line, 24 to 36 thread, is excellent, although some lines, little short of young ropes, are also used. The hook should be 10-0 to 12-0, shark size, and the bait either a live fish or large cut bait.

A method of fishing that is little short of an institution along the upper Atlantic coast, and is becoming increasingly so along the Florida coasts, the Gulf and the Pacific is surf fishing, which calls for a specialized tackle. One wades the surf and casts out.

A piece of strip cut bait or half a mullet is generally used for bait and is impaled on a No. 10-0 hook. It is cast and allowed to sink to the bottom where a wait is made for a strike. If a fish is felt at the lure, the line should be fed out, permitting the fish to obtain a good grip on the hook. The hook is then set with a powerful upward jerk of the rod and the battle is on.

RIGID TESTS PROVE QUALITY OF *Genuine* Ford Batteries

Genuine Ford Batteries undergoing the cold test in refrigerator where zero temperature is maintained, at the Ford Battery Testing Laboratory at Dearborn, Michigan.

These sensitive meters accurately measure battery capacities. The batteries in the tank to the right are undergoing a normal discharge test.

The high-rate discharge test—equivalent to holding down the starter button for eight minutes.

IMAGINE holding down the starter button on your car for eight minutes! Imagine discharging and recharging your battery 45 times with an overcharge of 100 per cent each time! Imagine overcharging your battery at a 10-ampere rate continuously day and night for thirty days!

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Plates used in Genuine Ford Batteries are of the highest quality materials. They have exceptionally large areas. Only vertical-grain wood separators are used. Posts are fused to lead inserts in the cover to provide additional strength. And cell covers rest on ledges in the case to provide better support for the elements inside.

Regardless of the car or truck you drive, when your battery must be replaced, remember that with a Genuine Ford Battery you can be certain of Ford quality, Ford standards of workmanship and Ford rigid inspections and tests. You can be certain of genuine satisfaction.

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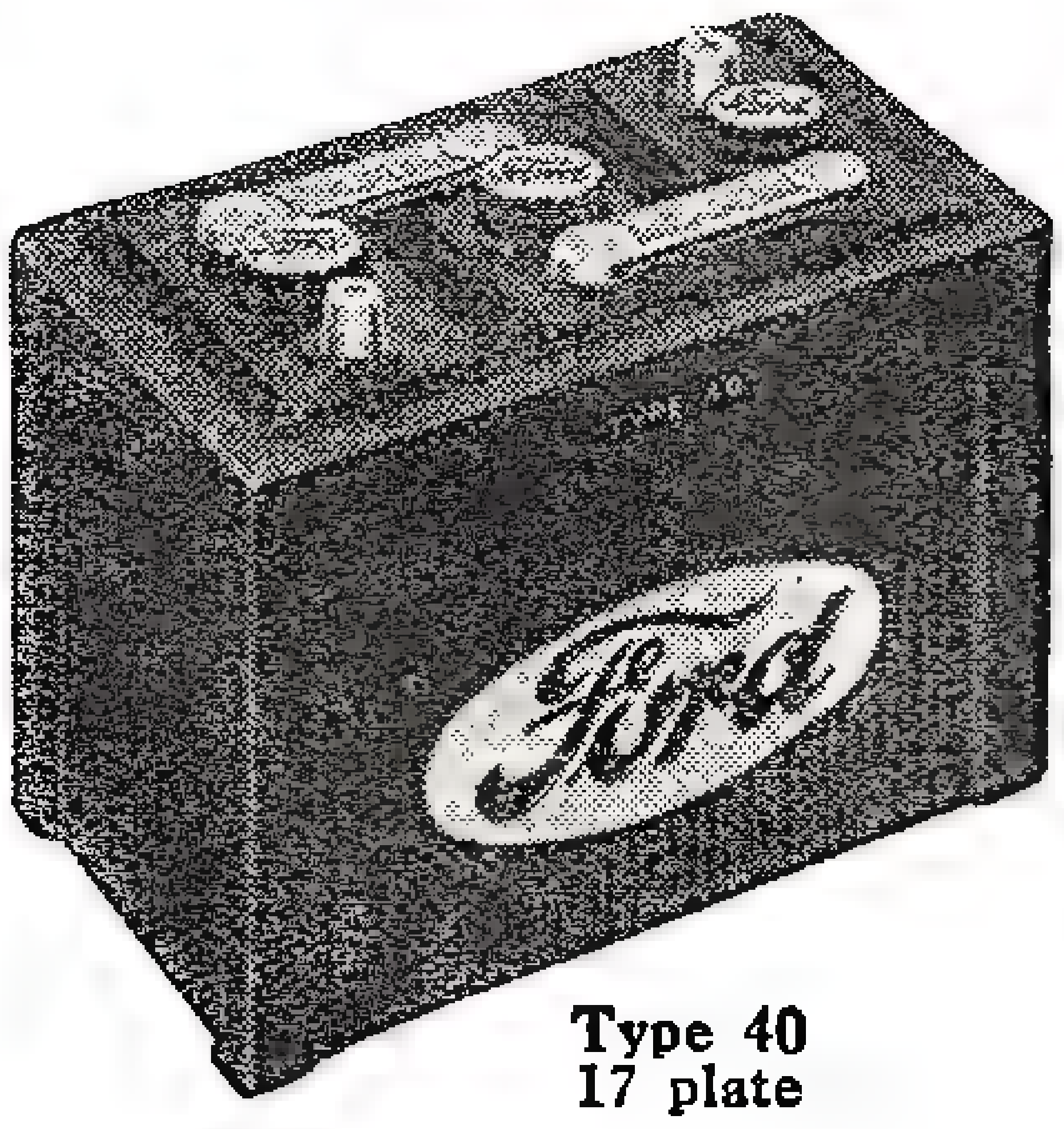
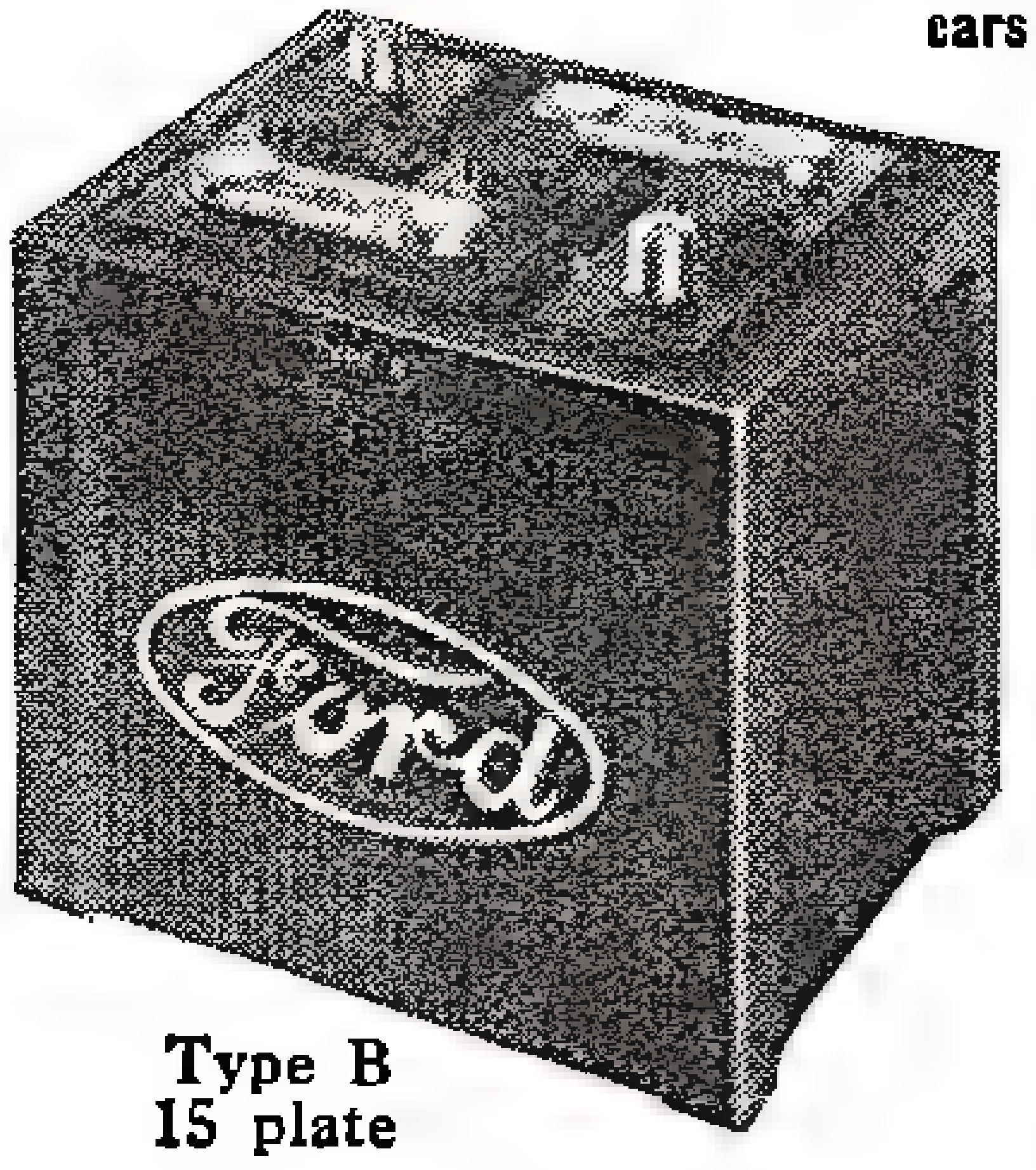
The complete line of Genuine Ford Batteries consists of a 13-plate battery, two 15-plate batteries and one 17-plate battery. The last is used as standard equipment in Ford cars and trucks.

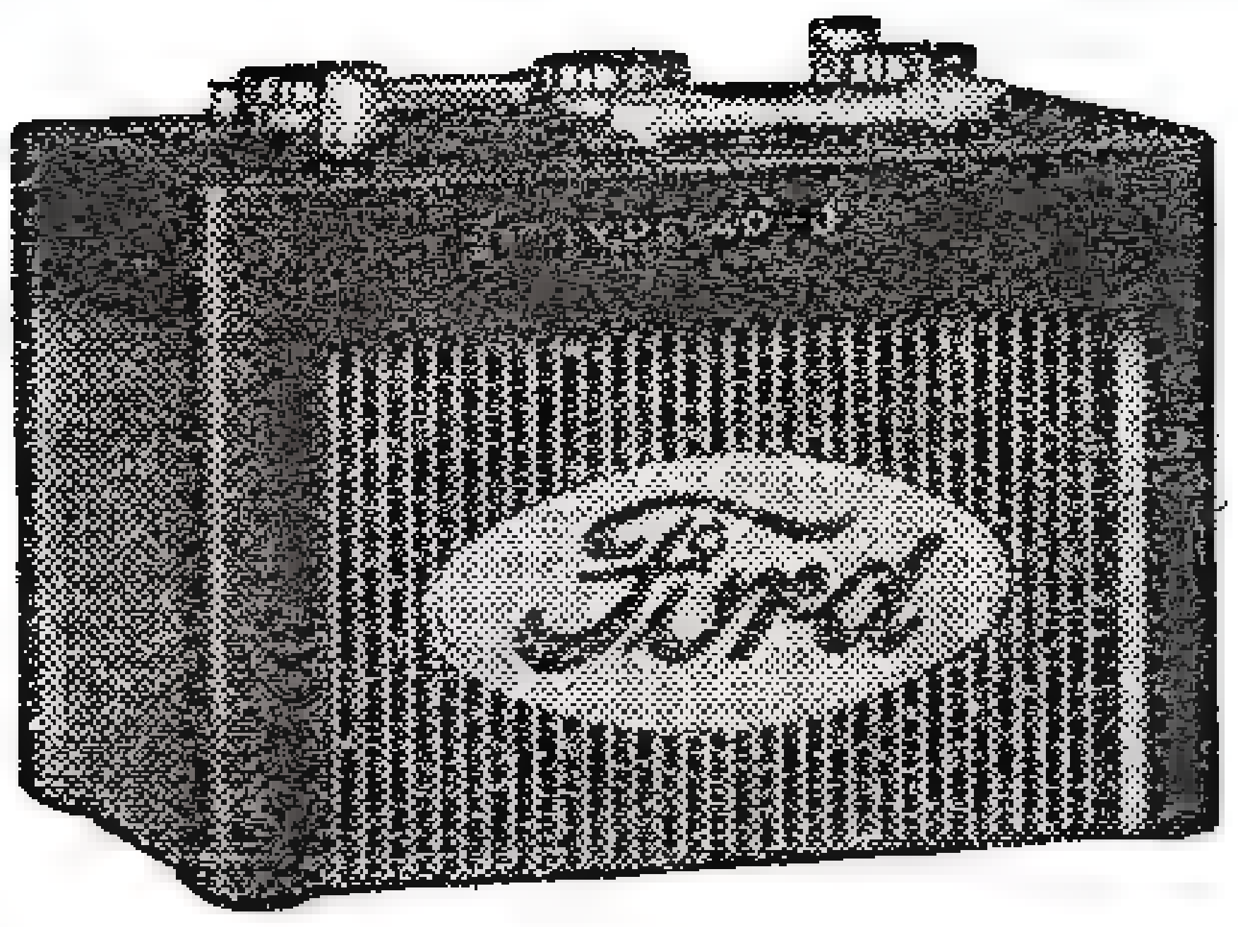
Type A
13 plate



Type 40
17 plate



Type B
15 plate



Type 40-D
15 plate

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Generator Makes Gas

[*Continued from page* 108]

manner depicted in the diagrams. Use a fifty-gallon oil drum for the large tank and another, slightly smaller, that will fit inside. To the bottom of the small tank attach an eye bolt so that it can be raised from time to time by an overhead pulley arrangement. The top of the small drum is cut off, as is the top of the larger one. A length of one-inch pipe is installed in the large tank as shown in the accompanying diagrams. The pipe is cut so that it projects several inches above the top of the drum. After assembling the pipe and installing it in the tank, fill it with water to within a few inches of the top. Be careful that no water is allowed to enter the pipe when doing this.

Connect up the vaporizer unit and half fill it with gasoline. Connect a gas appliance to the nipple on the one-gallon tank and the gas generator is about ready for operation. Opening the air inlet valve on the smaller tank raise it out of the water filled tank, close the valve and allow it to lower into the water once more. The weight of the steel drum will cause the air inside to compress and pass down through the pipe then on to the vaporizer unit, where it mixes with the gasoline to form an illuminating gas.

The apparatus is not only an efficient gas generator from the standpoint of expense, but a safe one as well. Gas generated by it is no more dangerous than city gas. The only attention which must be given the gas maker is the raising of the smaller drum when it drops down and adding of more gasoline from time to time. Before raising the tank always open the air inlet, closing it again after the raising operation.

Let Sound Tell The Story

[*Continued from page* 72]

By tempo and musical "timing" the audience may be excited or lulled into "earical" pleasures. Musical tempo is used for speeding up the action of the cartoon story when things rapidly happen. To do this a slow musical tempo is played as a background music until the tempo or "time" is established with the audience, and then the "time" is gradually increased. This literally sucks the audience along in what the Disney artist calls a "musical vacuum."

When bugs march off to battle in a pseudo serious portrayal of a march, four-four time is used, while six-eight time is used for swinging comedy marches. Two-four time is used for "background" music where there are "chases" or where music with a definite beat in which the action is gradually speeded. Three-four waltz time serves for scenes where beauty is emphasized.

Music and sound has become an exact science with Walt Disney. The music and sound effects in his cartoon psychologically tell the film story for the ears as the picture on the screen does for the eyes.

AND NOW FOR ONE OF THOSE SWELL, SMOOTH SHAVES I GET WITH A GILLETTE BLADE IN THE GILLETTE RAZOR —THEY'RE THE "TOPS"
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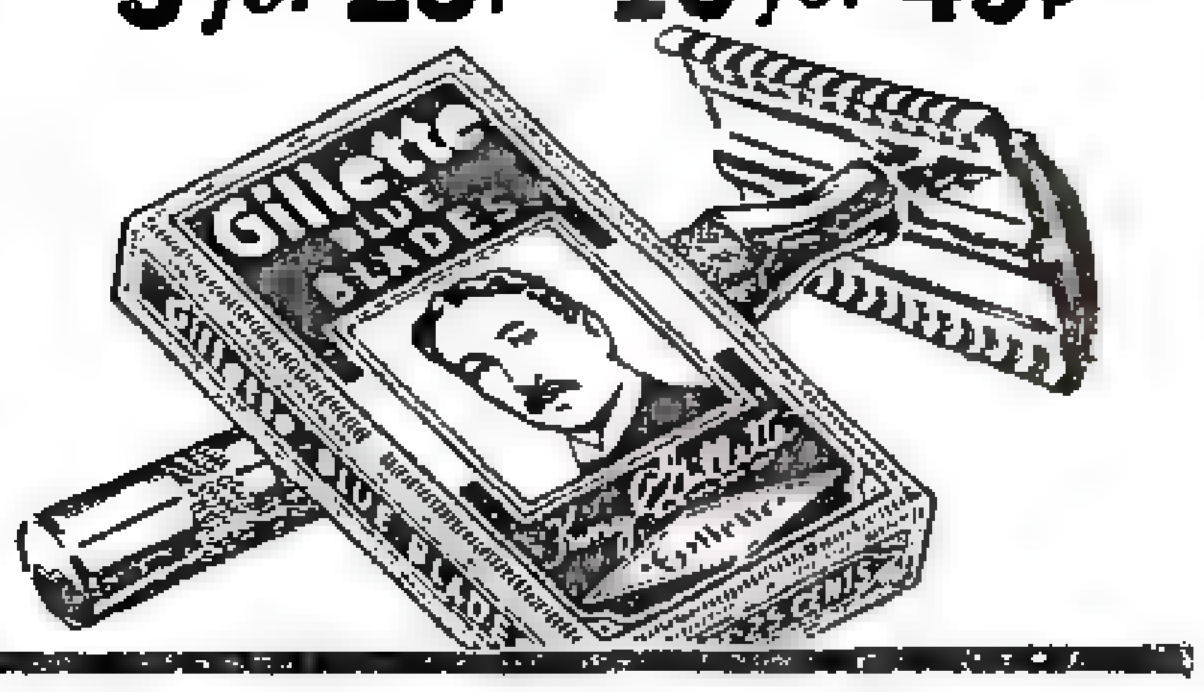

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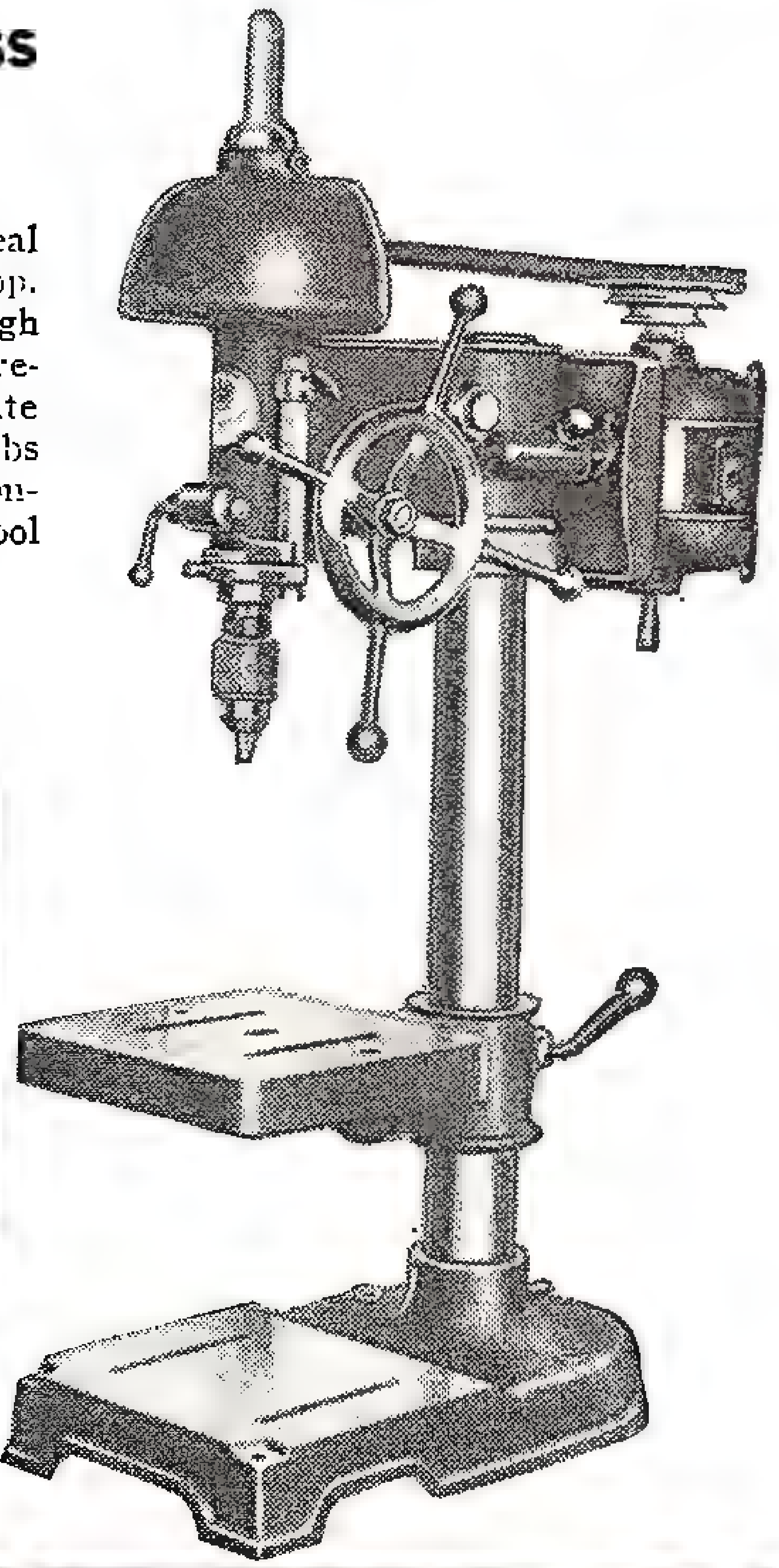

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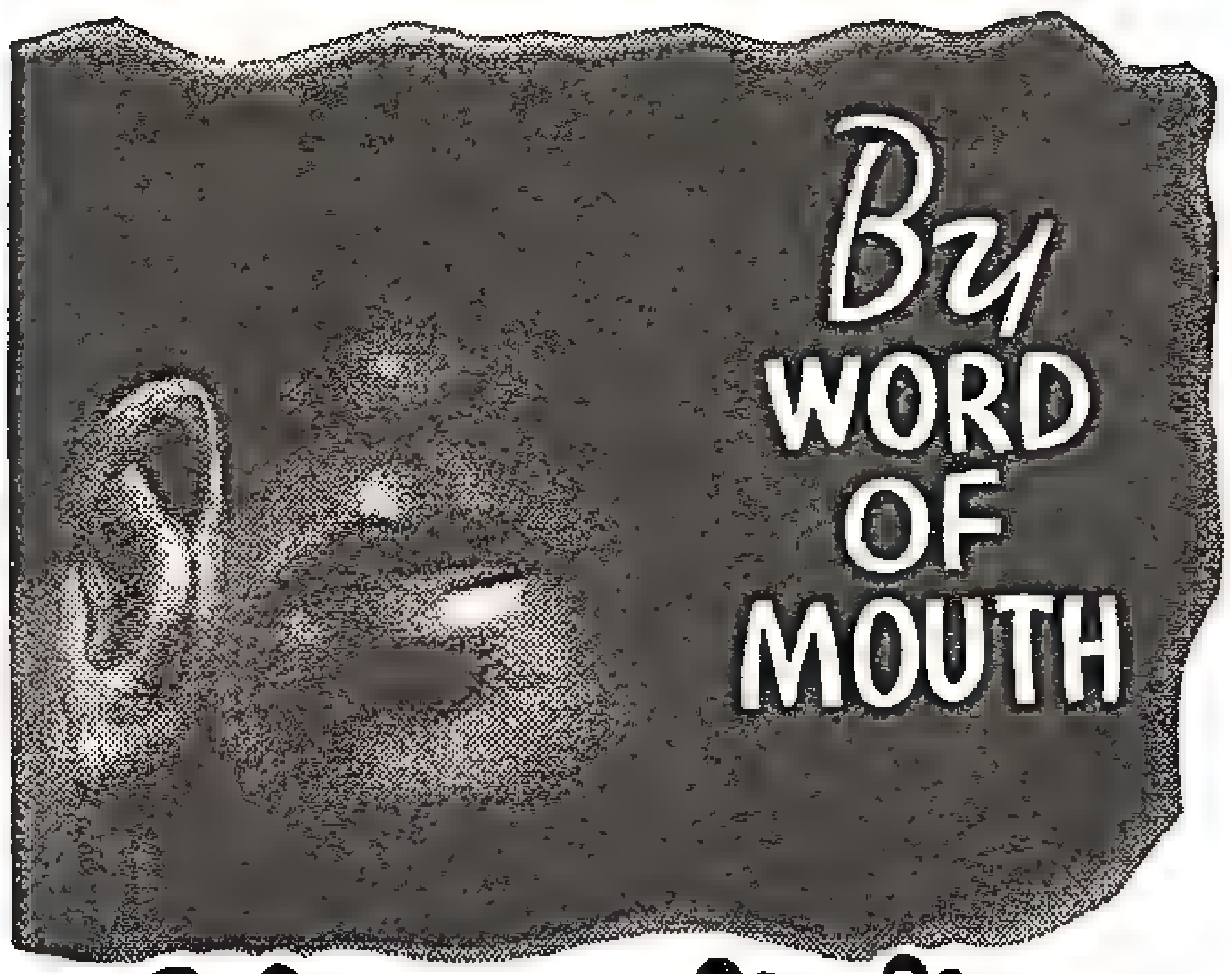

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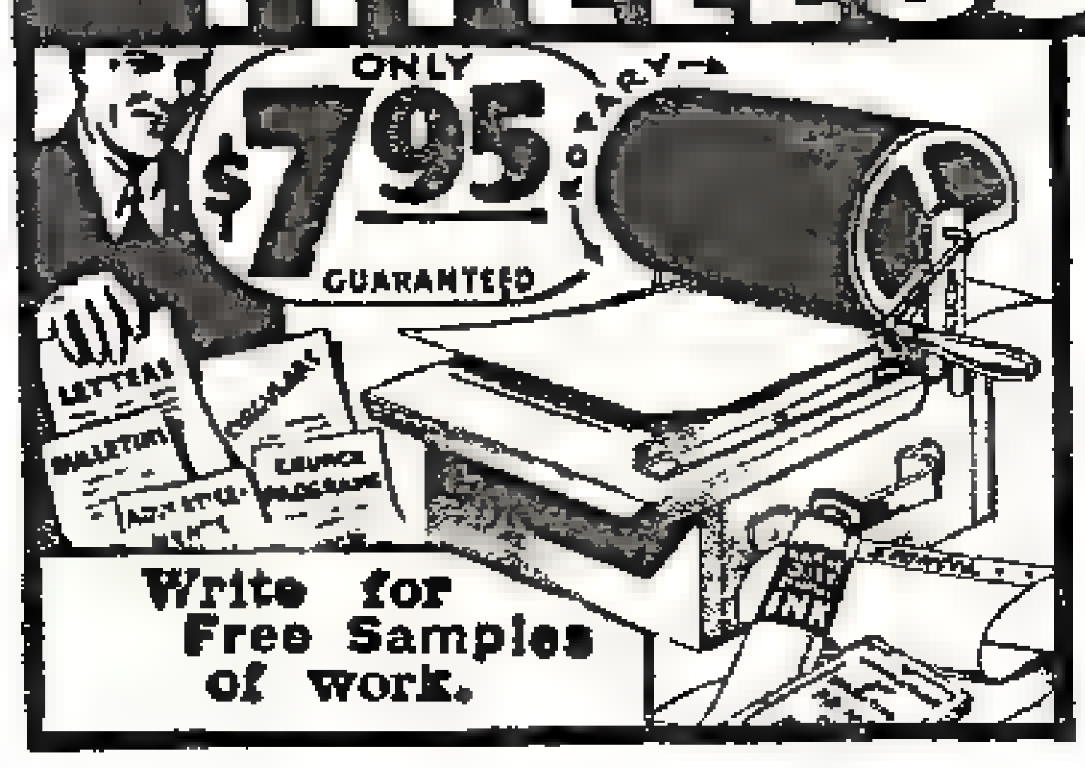

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Spinning Metal Projects

[*Continued from page* 112]

Another excellent wood-and-metal combination is a rather deep turned dish with a lining of lead which comes up over the edge and is locked just under the lip. It is ideal for flower bulbs which can be planted in wet gravel or sand and no moisture will thus reach the wood.

First turn the bowl to shape and finish the edges with sandpaper, filler and clear lacquer. Cut the lead sheet of sufficient size. Put a small wood block securely centered in the tail stock and apply a little pressure to keep it from working out of place. A drop of glue will lock the block and lead together. Turn the lead over the edge and lock it before molding the inside to shape with the dowel and candle.

Another type of metal-wood ash tray is so attractive that it is well worth mention. It employs spinning the sheet lead as has been described and also using narrow inlays. These narrow strips of cold metal contrast nicely with the rich tones of walnut and when tooled flush with the wood surface and finished as one piece make an excellent project, appropriate for the living room or richly appointed office.

Tiny Hand Power Grinders

[*Continued from page* 99]

of which are available. The smaller cutters have, for the most part, finer teeth and with them you can do much more delicate work than you can with the larger, rougher cutter.

After the carving has been completed figure may be colored by using india ink, water colors or lacquer. Use any color scheme that you feel suits the project. Cartoon characters in the newspapers are perfect sources of subjects for the amateur craftsmen. The figures are usually simple and can be duplicated so they are easily recognized without a great amount of skill.

After the craftsman has done the more simple forms of carving he should be familiar enough with the peculiarities of the various work so he may undertake something of a new, ambitious nature such as the ship lamp which was carved from a solid piece of walnut using a high speed hand tool and steel cutters. You will notice the figure in the photo is being detailed with an exceptionally small steel cutter; the type commonly known as a finishing bur.

In model-making, too, the hand grinder can be used to great advantage in sanding down balsa model ship and airplane parts. The accessory used for this is known as a drum sander with an abrasive band mounted upon the drum sander. These bands are available in a wide variety of sizes and grits suitable for practically all classes of model work. They have the advantage of removing considerable amount of material in a relatively short time and leaving an excellent smooth surface without need of further work.

Women Head Winners' List

[*Continued from page* 62]

used, won third prize of $5 for Elvin M. Weidman, of East Petersburg, Pa. Women who have experienced the annoyance of having ordinary clothespins work loose when wind tugs at the washline will appreciate Mr. Weidman's suggestion.

To make horseback riding more comfortable, especially for novice horsemen, George Morris, Box 59, Elizabeth, Pa., suggests a saddle that can be inflated by a hand pump. A prize of $2 was sent to Mr. Morris for his idea.

Edmund Rice, of 80 Peck St., No. Attleboro, Mass., was awarded a $2 prize for his suggestion of triangular rubber strips for window framing. Rubber frames would prevent breakage from slamming and vibration. At the same time, they would be watertight.

Miss Lorraine Bradley, of 2905—18th St., Superior, Wisc., submitted an idea for a detachable baby carriage seat that won a $2 prize. The seat would enable a mother to provide transportation for both a baby in the carriage and for a toddling youngster on the seat which would be attached between the carriage handlebars.

Prizes of $1 each were awarded to the following readers for their suggestions: David Suimont, Biwabik, Minn., Charles P. Cessna, 234 Market St., Johnstown, Pa.; Ray Preski, 861 Nebraska Ave., Toledo, Ohio, and Jerry Ball, 2405 Cranshaw Blvd., Los Angeles, Calif.

If you have any good ideas for needed inventions, send them to the Needed Inventions Contest Editor. If they are practical and have not already been patented by someone, you may win one of the ten cash prizes that are awarded by the contest judges each month. Here are the contest rules:

1. In 100 words or less explain your idea for a needed invention. 2. This contest is open to everyone except employees of Modern Mechanix Publishing Co. 3. You don't have to buy a copy of the magazine or be a subscriber to enter. 4. Write your name and address plainly on your entry. No entries will be returned. 5. The editors of this magazine will be the judges. All decisions will be final. 6. Mail your entry to Inventions Contest Editor, Modern Mechanix Publishing Co., Greenwich, Conn. Entries arriving too late for next month's contest will be considered for the following month.

Newest Auto Race Track

[*Continued from page* 65]

rail. At the most dangerous curves, low concrete walls supplement the rails.

A photo-electric cell master clock at the timer's booth and 28 separate clocks, with two men at each clock, insure utmost precision in timing the competing cars. A series of powerful 20,000-watt amplifiers carry news of the race from the announcer's booth atop a 145-foot observation tower.

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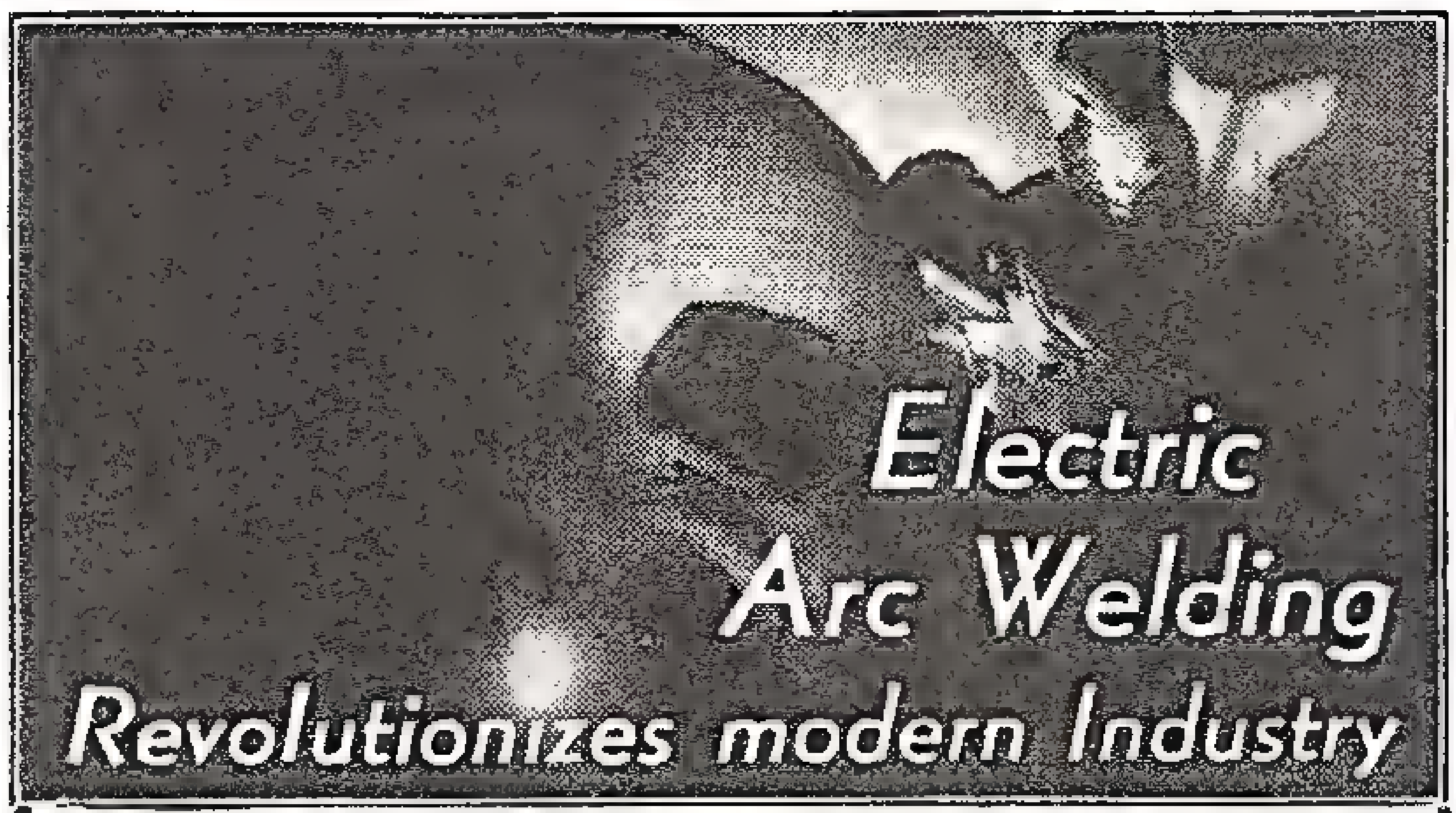

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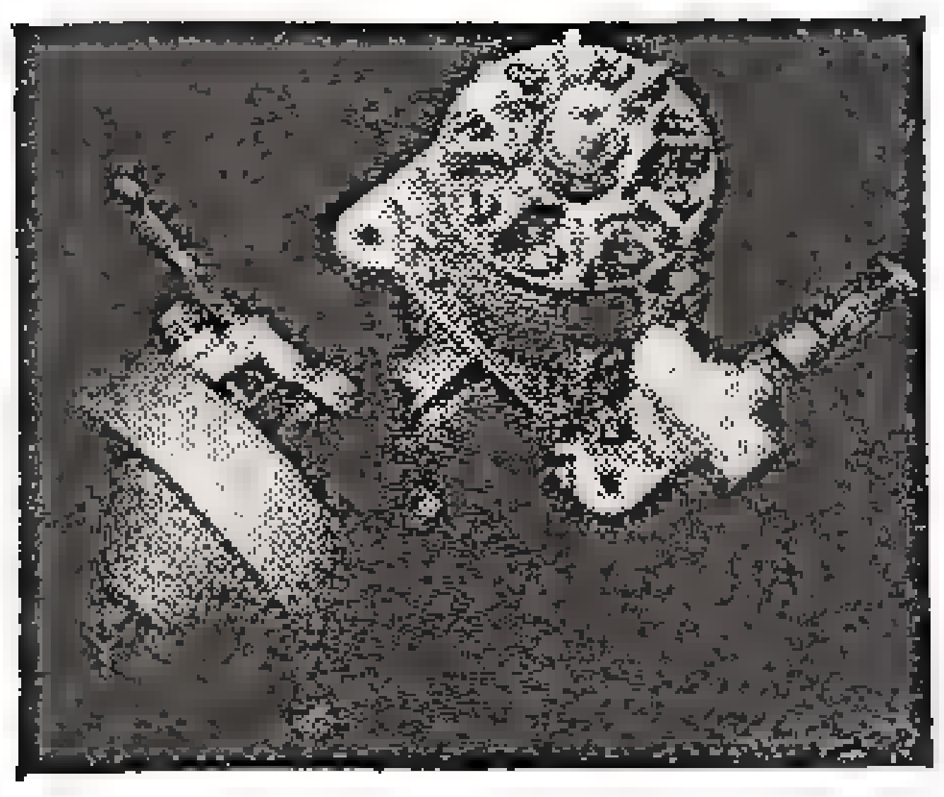

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"Jumping Jeff"—Tots' Toy

[*Continued from page* 97]

and cut out the spokes. Saw out of ½" stock two circles and bevel the edge to clamp around the rim of the tire. This may be quickly done on the lathe. Now screw these discs together on either side of the rim and a disc wheel results. Drill through the center of these pieces with a ⅝" drill, drive into this hole a piece of ⅜" pipe and assemble the wheel.

The mechanism which moves the head is simple to make with all details shown in the picture diagrams.

When finished and adjusted to work smoothly paint the toy in brilliant pleasing enamels. The toy makes a Christmas gift that will provide the smaller child with hours of healthful outdoor fun.

Completing The Mayflower

[*Continued from page* 107]

about 2¼ inches from the end of the bowsprit. The top-mast stay goes up between the cross trees, around the mast with an eye and down to the fore mast head with its lower deadeye directly under the cap. In the lower end of the fore top mast stay, there is a block, another block about one inch from the end of the bowsprit and the light hauling rope is seized to the end of the bowsprit and reeves through these down to the belaying pin on the foreward forecastle pin rail. The mizzen stay goes with an eye around the mast directly above the cross trees with a lanyard at its lower end fastened with a loop under the wedge cleat at the foot of the main mast.

Now prepare the yards and parrels in readiness for hoisting and rigging the sails. The first thing to do is to cut and sew the sails. Cut them large enough to allow for the hem all around. Sew into the hem, medium cord, and be careful to form little loops at each corner. For material for the sails use balloon cloth which can be purchased from ship model supply houses or use a linen that has a canvas texture. Before you cut it, however, sew vertical rows of stitching ½ inch apart, taking pains to get them parallel. The edges of the sails are curved. The main and foresail carry bonnets or small foot sails. These are fastened to the larger sails with a marline hitch. With a little study on the sail plan, you will note that the fore and main sail are rigged very similar. Start rigging the main by lashing two medium sized blocks ($\frac{3}{16}$") about ¾" on each side of the center line of the main yard. One inch further out from these, lash smaller blocks (1/18") which will sheave the clewline.

Now make brace pendants of medium cord 2" long with a large block in one end and an eye in the other. This eye goes over the end of the yard. Lash together a small and medium block and secure them at the top position at each yard-arm. The medium block runs the top sail sheet and the small block, the main yard lift. Secure small blocks under the crosstrees for running the lift-cords. When this is done, reeve a two foot length of medium cord through the single hole in the tye block, bring the two ends of the cord up through the holes in the cheeks and hitch the ends to the center of the yard so that the tye block will hang almost an inch above the top of the knight-head when the main yard is raised and draw a lanyard through these in the following manner: Secure a piece of fine cord to the staple at the foot of the knight, bring it through the first hole in the tye block then through the corresponding hole in the knight and so on until the lanyard is reeved. Belay the free end to the knight head around the lanyard.

You will now need a parrel to retain the yard to the mast. Construct this from three $\frac{1}{16}$" strips of wood drilled with three holes each.

Use light cord for the lifts. Secure this cord under the crosstrees, draw the ends through the small block at the yard arm, back up through the block under the crosstrees, then to the deck and belay to the cleat marked B aft of the deck guns. The main braces start at the taffrail and reeve through the pendant block, then back to the block lashed to the taffrail and belays to cleat C on the poop deck. Now for the sheet line—pass a short stick (toggle) through the loops at the lower corners of the sail and lash a large block to it for the sheet and above this a small block for the clew garnet leads. Start the sheet of medium cord at the ringbolt on the third wale, pass it through the large block just mentioned, back to the block forward of the ringbolt, then through the hole in the bulwarks just aft of the main shrouds, and belay to one of the large cleats D just aft of the two-sacker guns on the main deck. The tacks are the next in line. Use a single rope of medium cord. They are secured to the toggle stick and reeve through a hole in the chesstrees, then through a hole in the bulwarks, and belay back to cleat H inside the main bulwarks.

The bowlines are crowsfoot at the leaches, rigged with bull's-eyes and go directly forward to cleat E on the forecastle deck. Clewlines of L cord start at the quarter at the yard next to the clewline blocks on the yard, go down to the small clew blocks at the lower corners of the sail, up through the blocks at the quarter yard and belay down to cleat F at the foot of the mast. Use light cord for the buntlines which are tied to the foot of the sail and go up on the lee (forward) side and reeve through blocks at the cheeks and belay to U bolts or cleat at G near the foot of the mast.

In making the flag, it can be painted upon white silk with textile or oil colors. If using oil colors, be sure to use just the right consistency to keep the color from running. On the fore topmast, there is the flag of St. George's cross. On the main topmast we have the red cross of St. George superimposed on the white cross of Saint Andrew on a dark blue field.

With the installation of the flag the Mayflower model is completed. Placed in the neat plywood cradle, it makes a beautiful home decoration.

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Bethlehem Opens New Plant

[*Continued from page* 86]

of rollers, that squeeze it thinner, wider and much longer, is one of the best spectacles of modern industry. Clouds of steam arise from the cooling water sprays on the rolls, electric switches click, and the long, radiant carpet of metal rushes down a path of smooth-running rollers to be coiled automatically like so much adding machine tape.

Behind this rapid metamorphosis of crude steel into sheets for automobiles, refrigerators, furniture, and a hundred other products, is precise electrical control. The modern rolling mill would be impossible without the flexibility and responsiveness of motors, thousands of them, mounted upon the machines. In a lofty central room—"pulpit" to steel men—where he may survey the whirling mill below, is the god of the machine, the operator, playing with skillful mind and fingers on the bank of switches that are masters of the wheels below.

But do not imagine the human element is entirely lacking. Automatic as the machine appears in its smooth operation, constant manual adjustment is necessary in order that the strip may flow out smoothly. And man had to make the machine.

Priest Maps Roof of World

[*Continued from page* 83]

Besides discovering the fossil glacier on his 1936 expedition, the Glacier Priest exploded the theory that dinosaurs roamed the Alaskan region in the Jurassic period. Father Hubbard located the only Taku Indian alive who had seen the giant fossil tracks in North British Columbia.

On his way to meet the Indian and find the fabled tracks, Father Hubbard and his companion, Ken Chisholm, former football star of Santa Clara University, had to leap to safety on the rocks as their heavy-laden 30-foot Allegheny metal boat was capsized in the swirling ice floes of Twin Glacier River. Receiving the priest's blessing, Chisholm swam to shore to get aid. After Father Hubbard had been on the rock several hours, Mary Joyce, famous girl dog musher, sighted him from her motorboat and rescued him.

When he finally saw the fossil tracks, he ascertained they were only bear tracks and only 200 years old. They were 17 inches long and nine inches wide.

Five years ago the Glacier Priest took the first photographs of belching Aniakchak volcano, which has the largest crater in the world. The next year the daring aviator Dorbrandt flew him over it. In 1934 he astonished the world by landing in a seaplane on a lake within the crater.

But the Glacier Priest thinks his daring deeds pale beside his discovery of free chlorine gas. He trapped and bottled some which is now in the Carnegie Physical Laboratory at Pittsburgh.

He thinks this may explain the mysteries of death of people near Mount Katmai when it erupted some years ago and produced the Valley of Ten Thousand Smokes, which the Glacier Priest explored.

Including the Glacier Priest, the exploration party consisted of five men and four dogs. Each man carried a pack of 100 pounds and each dog transported 50. Other party members were Edgar Levin, graduate student at Stanford University; George Getty, youthful Oregon geologist, Cavalier and Chisholm. The expedition was joined in Alaska by John Dimond, 16, son of one of Alaska's Delegates to Congress, who was badly burned when one of the party's fishing boats caught fire.

Other casualties of the trip included two broken ribs and some torn muscles suffered when Ed Levin tumbled headfirst into a 50-foot crevasse. And Father Hubbard himself sliced off the top of a knuckle, and blood poisoning set in.

Against these haphazards, however, the Glacier Priest thinks his successes were well worth all the dangers, privations and sufferings.

As a result of his adventurous summers in the North, Father Hubbard says he has sufficient evidence to prove that the desolate waste of the Alaskan Peninsula is the cradle of most of North America's violent windstorms.

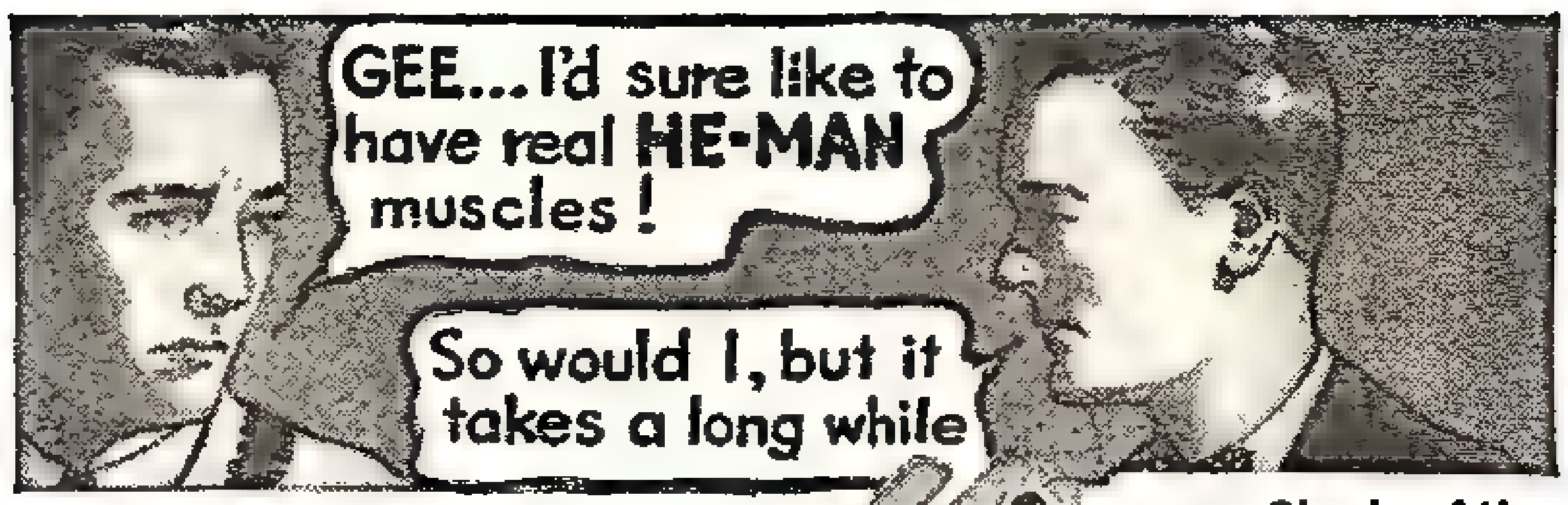
How hot is the lava that gathers on the outside of an active volcano cone? While climbing up one of the smaller volcanoes the explorers were almost blown off by a 100-mile-an-hour gale. Ironically enough, the heat of the lava beneath their feet almost burned their shoes off, while their bodies were well nigh frozen. No wonder their shoes were scorched! The Glacier Priest's thermometer told him that less than 10 inches under the surface of the volcano's swollen sides, were temperatures of over 400 degrees Centigrade.

Throughout the Aleutian Islands the explorer has been gathering evidence of a large aboriginal population, in an advanced stage of culture. He believes this island chain was one of the ancient roads by which man first came into North America, although the main route, he points out, was by the Bering Sea.

In keeping with this theory, he says, the people of Attu and Agattu Islands, the farthest eastward of the Aleutians, speak a strange language which seems to have some relationship to the speech of the hairy Ainu, the aboriginals of Northern Japan. This may constitute proof of an entirely independent invasion from Asia.

Father Hubbard also points out the existence throughout the Aleutians, of a strange sort of Rock carving which can be traced from Central Siberia, through Alaska and down the Pacific Coast to Mexico. This appears to mark the passage of some aboriginal people who had reached a fairly advanced state of culture.

The Glacier Priest now hopes within a year or so to uncover corroborative evidence of the migration of Asiatics many long years ago to North America.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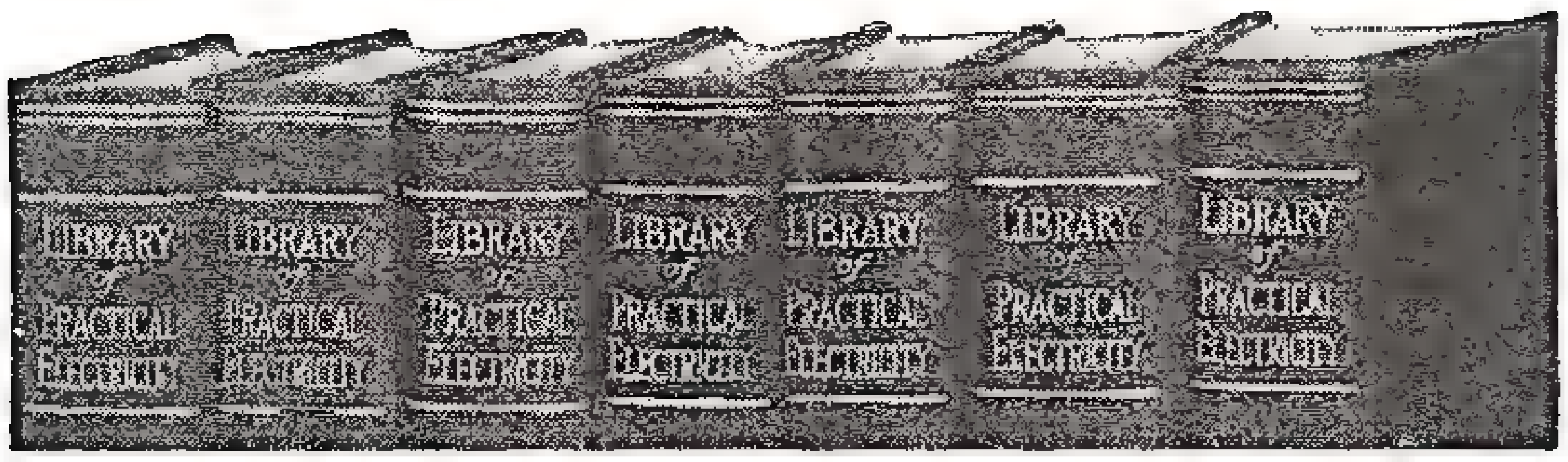

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Christmas Circus For Kiddies

[*Continued from page* 101]

horses can be of various markings, but each team should be matched.

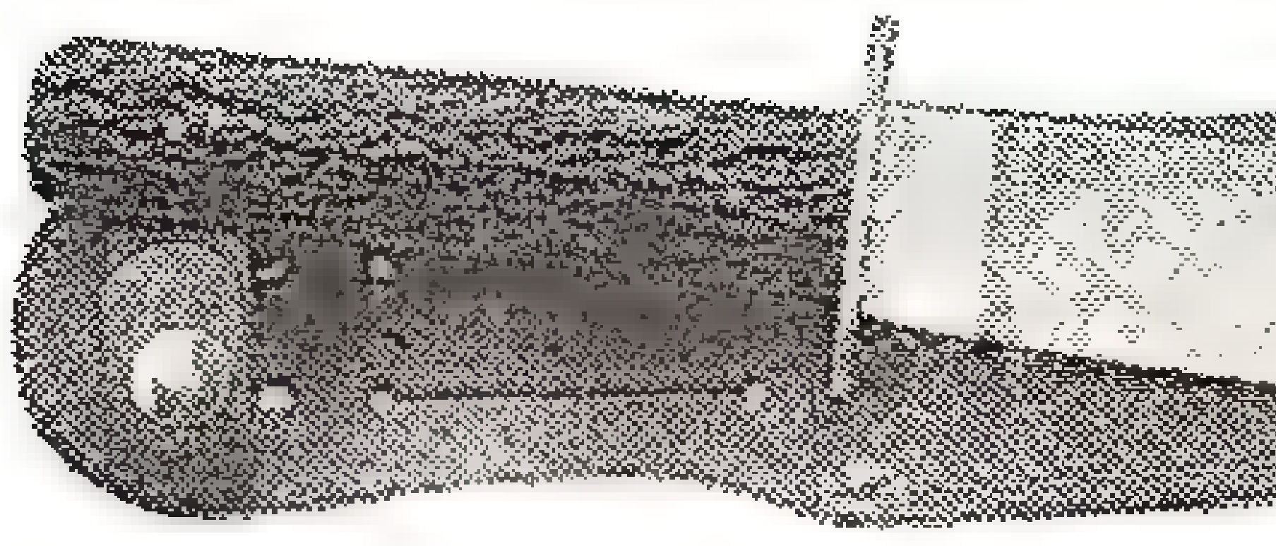
Assembly of the wagon is clearly shown. The smaller front wheels are made to turn on a screw in the manner shown. Four to eight teams can be hooked up on each wagon and any youngster will thrill to hitch up long strings of them for a parade.

A trick elephant to go with the circus can be made to assume all sorts of comical attitudes. Three-quarter-inch white pine is used for the body with a jointed trunk, and legs secured with rubber bands. The performing horse, clown, monkey as well as camel, lion and giraffe should be mounted on a wood base so that they will stand up. Paint circus toys in bright enamels.

ANSWERS TO MM MEMORY TESTERS

(Questions on page 54)

1. Rectifiers convert pulsating alternating current into direct current. The most common types of rectifiers are used in radio receiving sets.
2. Air can be weighed with any sensitive laboratory balance. A liter of air weighs about 1.293 grams.
3. A hydraulic ram is used to pump water higher than its source without the use of external power. It has one disadvantage and that is the amount of water it wastes.
4. There are two kinds of energy, Potential and Kinetic. Energy which a body has by virtue is known as Potential. Energy produced by the motion of a body is Kinetic.
5. Gold and silver, when cast, shrink upon cooling. If coins were made in this manner they would vary in size. Stamped coins are always uniform and can be made more quickly, too.
6. Sound travels comparatively slow through air. This can be demonstrated by the fact that steam issuing from the whistle of a distant locomotive is seen several seconds before the actual sound is heard. Sound transmitted by wire travels at the rate of approximately 150,000 miles per second.
7. A Centrifuge is a machine used to separate liquids having unequal densities. A cream separator might be classified as such, although the Centrifuge is a laboratory device.
8. The Wheatstone Bride is an instrument which determines the value of an unknown resistance. Breaks in long distance phone lines are located with this instrument.
9. Only iron and steel and their immediate alloys can be magnetized. All other metals are non-magnetic.
10. The air surrounding a "vacuum" cup holds it fast to the object since the air between the cup and surface has been evacuated. Actually there is no vacuum involved; the real pressure is on the outside of the cup, not the inside.
11. Copper will expand considerably more than any other common metal. In expansion aluminum is next.
12. Water or any other liquid with a similar specific gravity can be cooled to below the freezing point without solidification. The process is known as super-cooling and must be done without jarring the lquid. If shaken after being super-cooled the water will freeze instantaneously.



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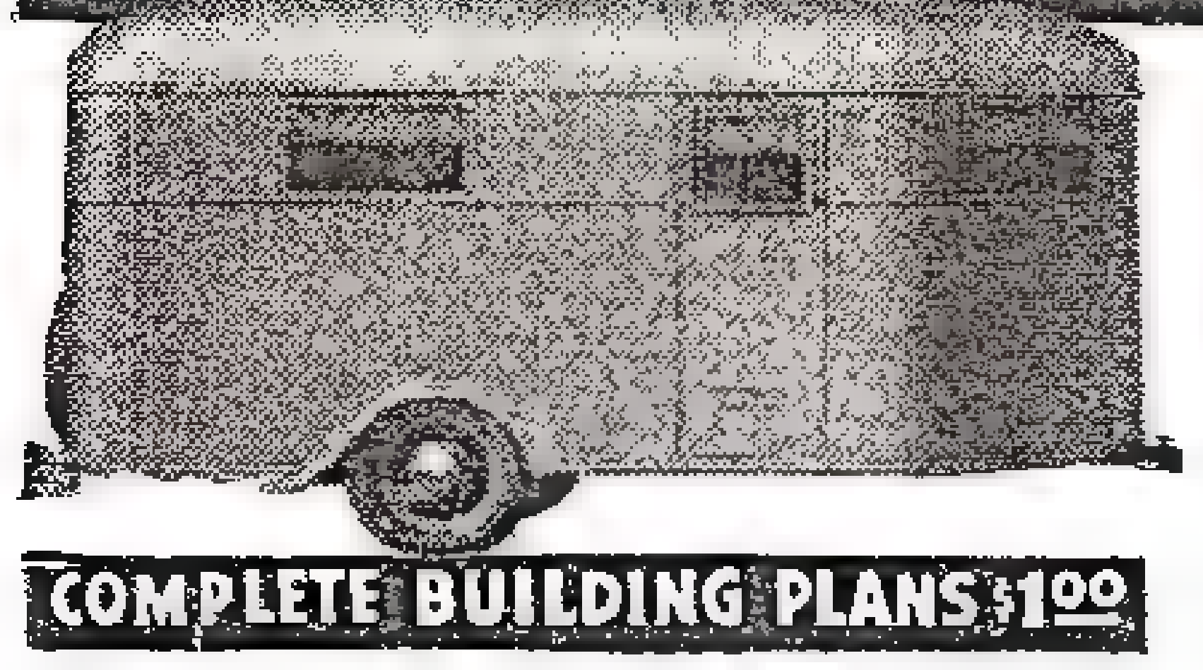

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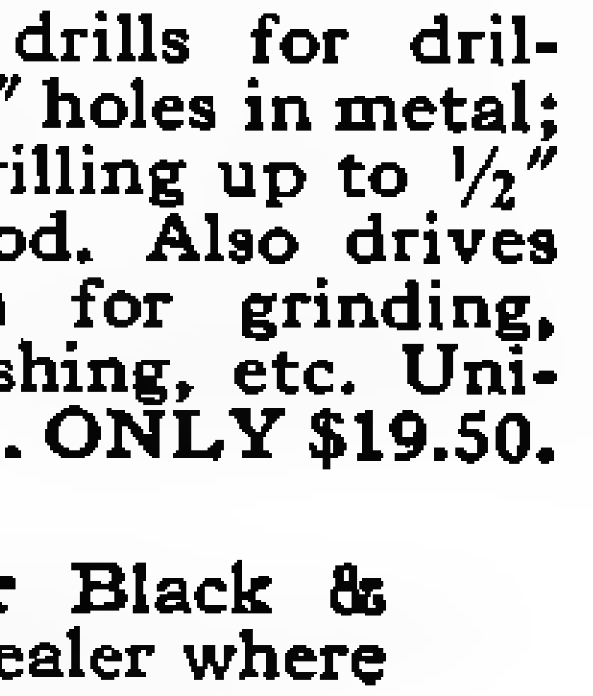

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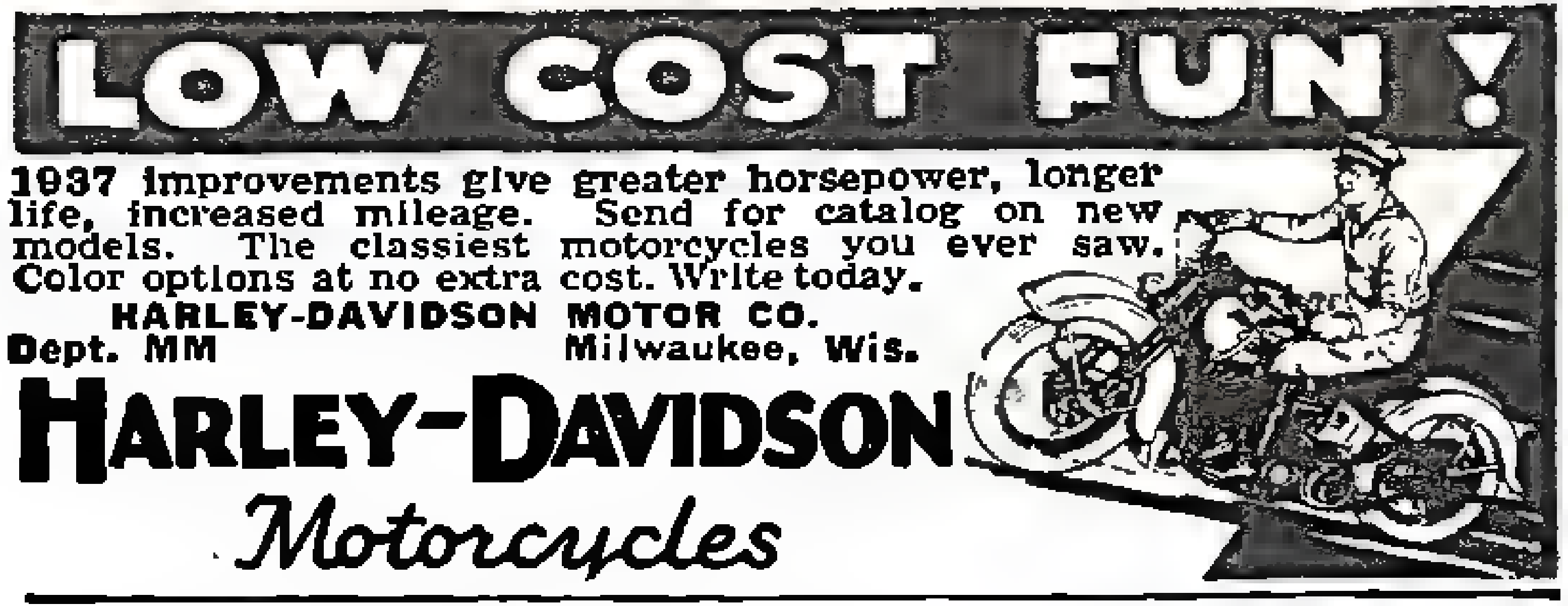

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Utility Amplifiers

[*Continued from page* 91]

receiver or other radio device. The two-tube DX-ER which appeared in last month's MM can be powered with this amplifier.

Since the pictorial diagrams show the exact locations of all parts and their proper connections little detail on the wiring is necessary. All resistances are of the carbon pigtail type and are rated at one watt. The fixed condensers are of the tubular type except for the two .002 mfd. units which are small mica condensers. The electrolytic condenser in the power supply consists of a 8 and 16 mfd. unit in one case with a single negative lead for both. Power transformer is a midget type with a 300 volt, center-tapped plate winding, and two filament winding; one a 6 volt and the other a 5 volt.

The dynamic speaker field winding serves as the filter choke in the power supply. The speaker is a midget dynamic type and attaches to the amplifier through a 4-prong plug. Ordinary tube sockets are used for both the speaker plug connection and the external power supply cable.

The complete amplifier can be built for less than $9.00 including tubes. It is attached to a battery operated receiver by connecting a 50,000 ohm carbon resistance across headphone terminals and connecting input of the amplifier to the B minus and plate prong of output tube on the receiver.

Extend Holiday Greetings

[*Continued from page* 95]

of this drive wheel, as diagrams indicate, moves in the ½" slot cut in the lever to give it a right to left motion which is transmitted to the reindeer through a stiff wire to give them a galloping motion.

Santa in the sleigh is mounted rigidly against the background by three bolts and spools. Black ribbons are glued in place to represent reins and traces. The display is driven by an electric motor located on the ground and connected with a speed reducing unit.

Another attractive decoration is a modernistic Christmas tree. This is formed of four step-like stringers mounted on a 3 foot square base. The tread cuts in these stringers are 3⅛" and the riser cuts 9 inches. These risers are beveled along the edge to a 45 degree angle to provide a flat surface to which the ⅛" pressed wood covering is secured with brads.

Construct the base of 1"x6" material, brace, and cover with ⅛" pressed wood. The truck of 1"x6" material is 8" square and 10" high, and is nailed to the base and tree. One inch holes bored in the treads and 2" holes bored in the bottom of the tree section are backed up with colored Cellophane or flood light gelatin and lighted from within the tree by means of four 50 watt and one 100 watt lights as shown. The tree and base are painted gray and the quarter and half round mold trim is painted vermilion. The tree may be covered with clear Cellophane to provide a glistening reflecting surface for the colored lights within.

Another Christmas tree in the modern manner may be constructed from an empty 20-gallon, cone topped, jacket can from which the wood covering has been removed. After cutting the sides to form six wedge shaped segments fit the spout over a wooden plug screwed to the wood base.

A ten foot two-by-four cross forms the frame for a giant star which makes a simple yet effective lawn decoration. Place the cross-arm 6 feet above the ground, and set 1" screw eyes in the three upper extremities of the cross and in two stakes driven into the ground four feet on each side of the upright. About the heavy cord laced through these screw eyes, twine a light cable in the outline of the Star of Bethlehem.

An electrically lighted, revolving wreath may be constructed from the under-carriage of a toy wagon to which

[*Continued on page* 134]

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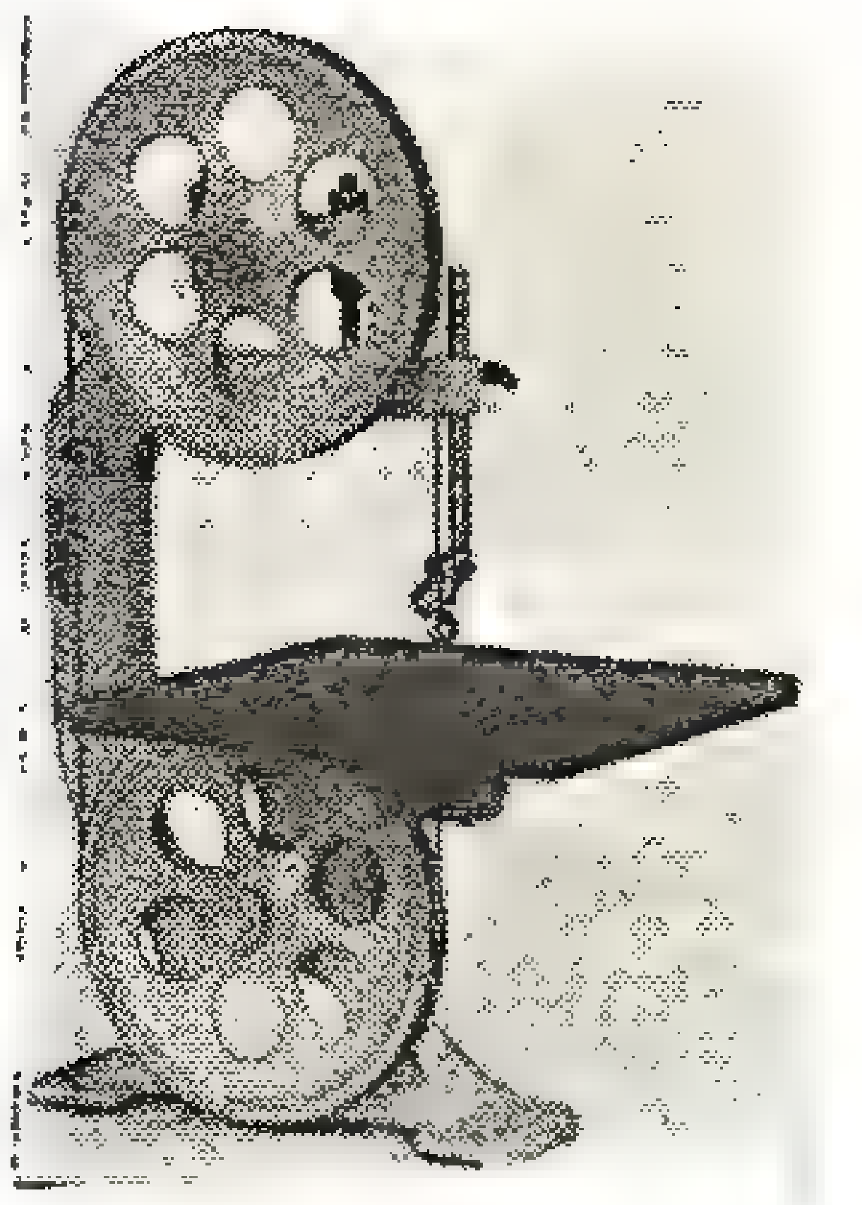

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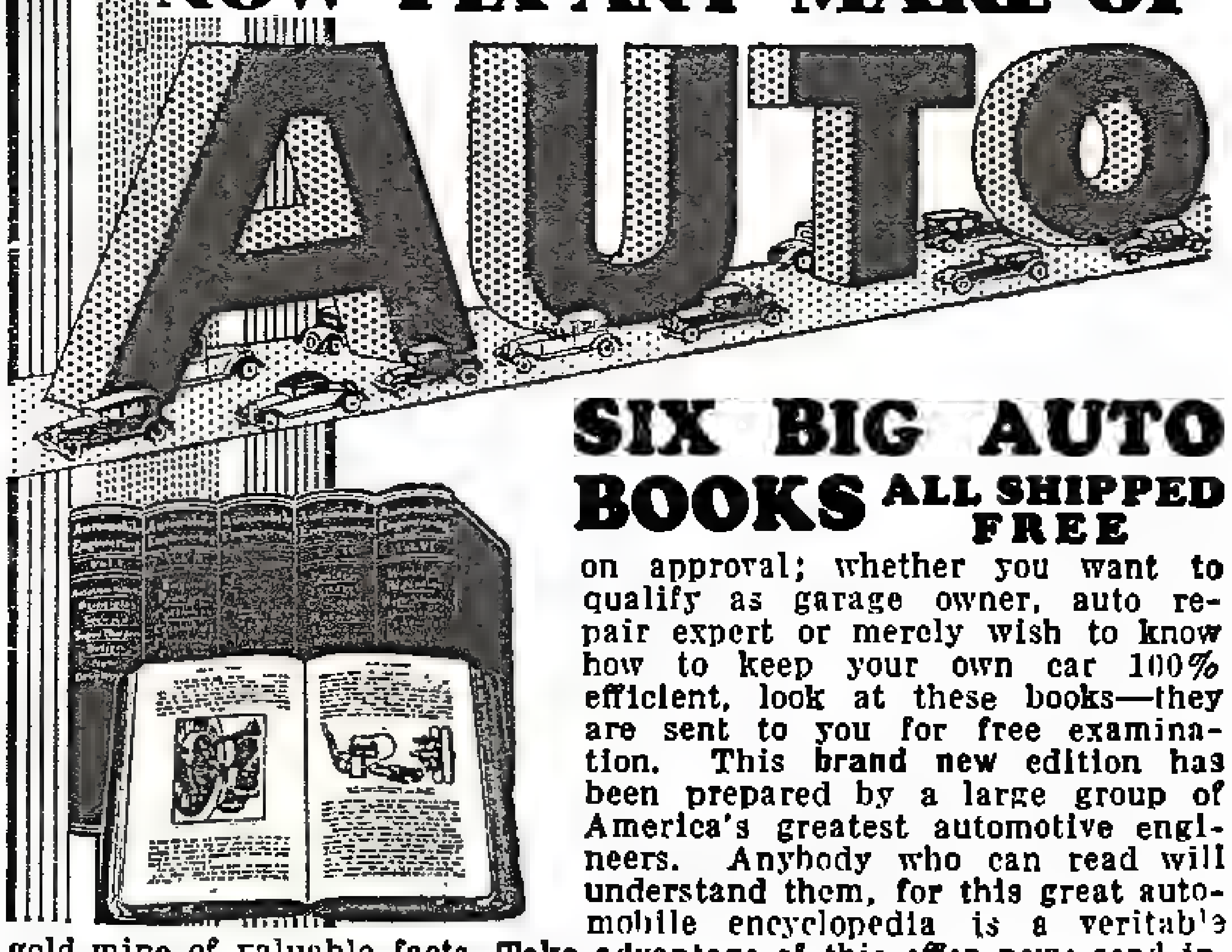

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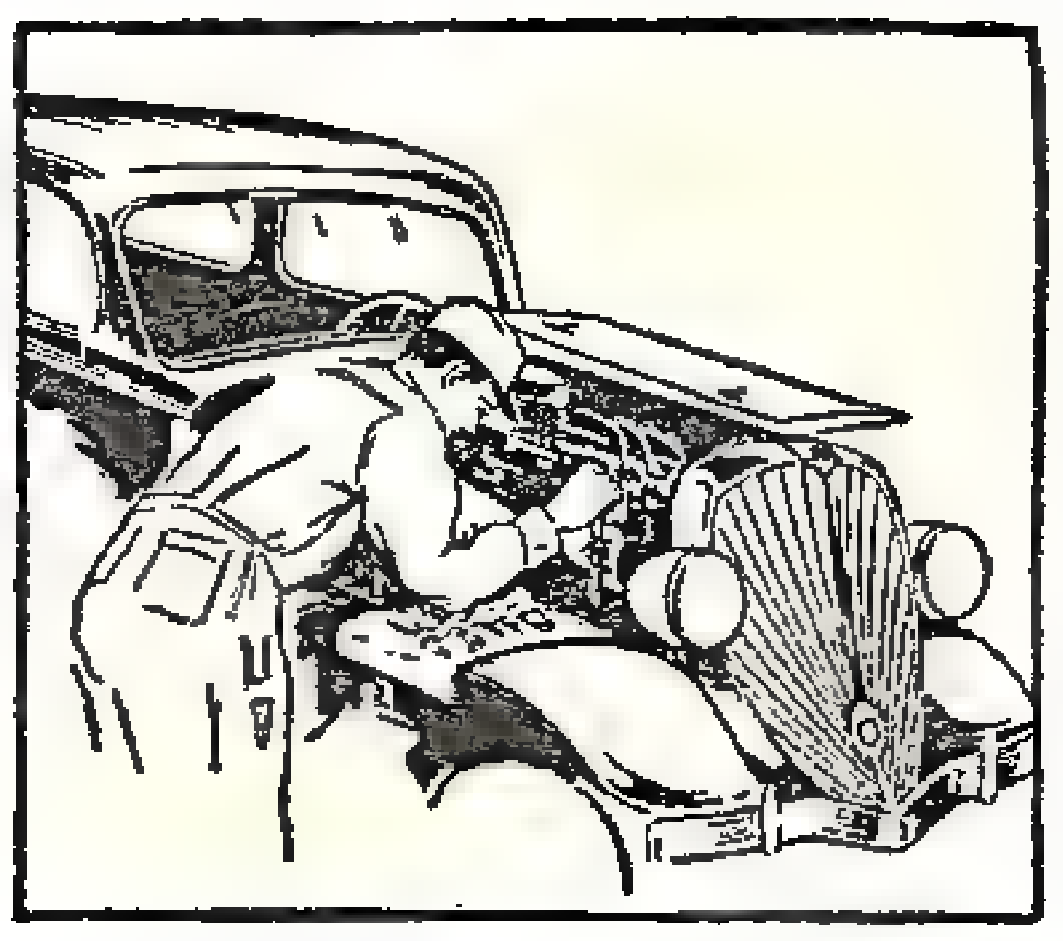

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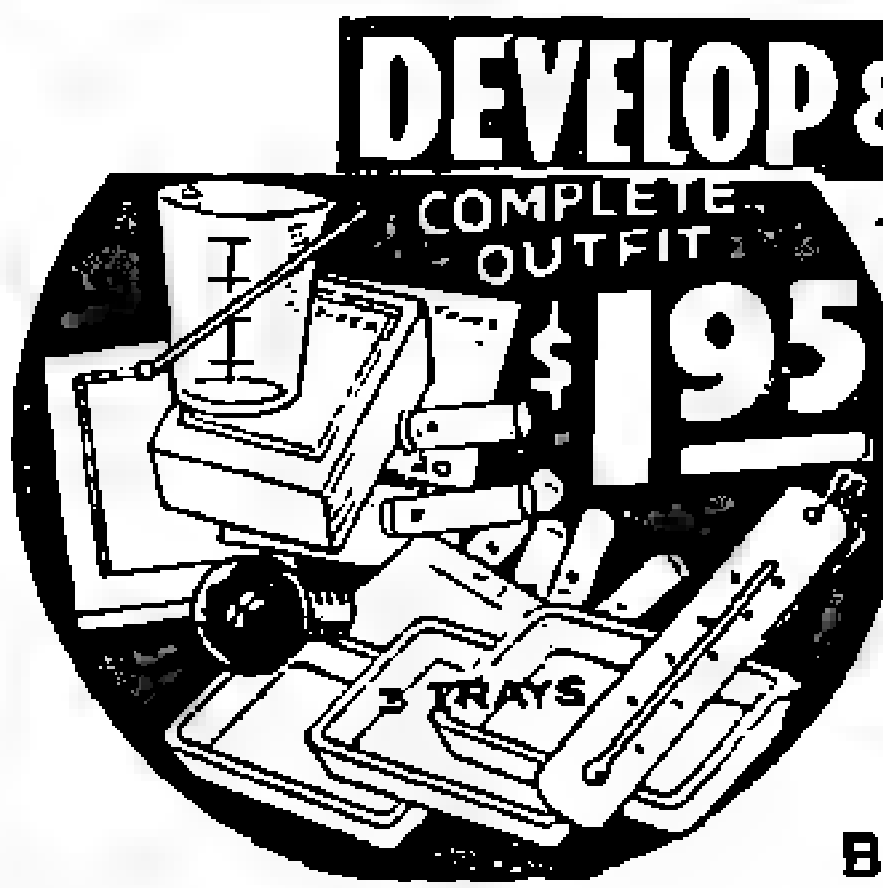
Pages 8 and 9



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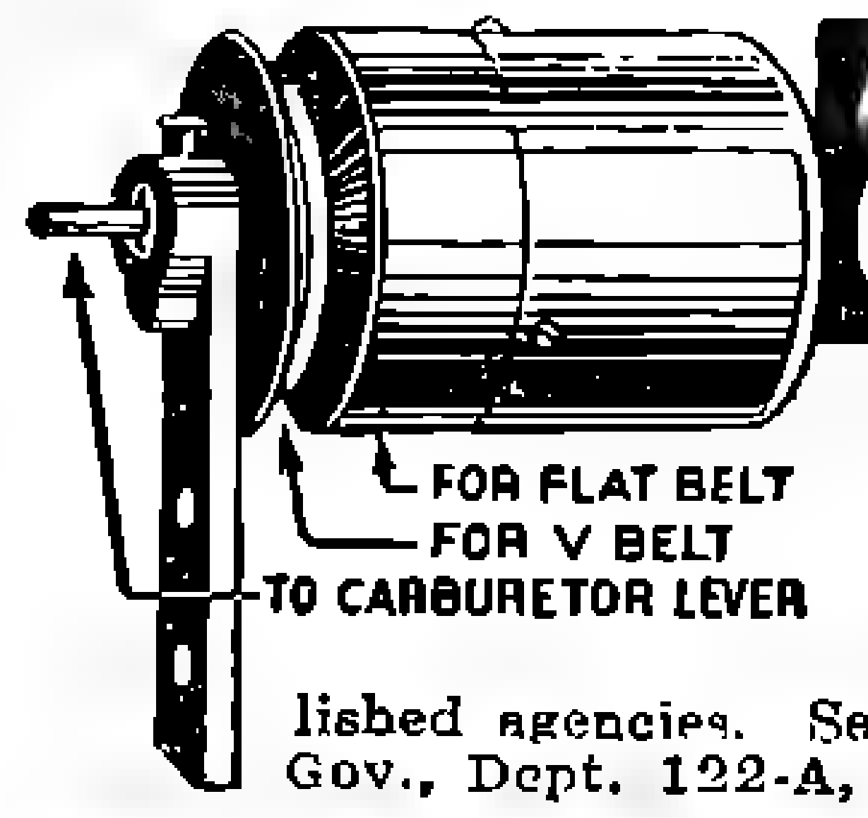

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Extend Holiday Greetings

[*Continued from page* 132]

is attached a 36-inch holly wreath. The wheel supports of the wagon are mounted on a platform and one wheel, from which the rubber tire has been removed, is equipped with strap iron brackets to which the wreath frame of wall board is attached A circular wall board background on which the season's greetings are lettered is secured to the axle by means of a strap iron support and lock nuts. This portion of the display remains motionless.

Genuine holly leaves are tied with string to a piece of heavy burlap which is cemented to the circular wall board form, the reverse side of which is wired with four 50 watt colored lights. Current for these lights is supplied through two spring brass contacts which ride on two brass strips bolted to the rear face of the wreath. Small red Christmas tree lights secured to the face of the wreath to represent berries also connect to this current source.

A round leather belt traveling in the tire groove of the wagon wheel is connected to the speed reduction unit. Candy pail lids screwed together form the large pulleys of this unit while the smaller pulleys which are screwed to them must be turned on a lathe. Such a unit made to the dimensions given will reduce the speed of a motor from 2,000 R. P. M. to approximately 8 R. P. M. For slower speeds, or for motors of greater speed, another pulley unit may be added.

The snow covered face of the flashing "Merry Christmas" is made by molding Plaster of Paris over nails driven into a wall board background in simulation of the uneven contours of banked up snow. Over the opening, theatrical scrim is glued and backed up with a sheet of heavy cardboard in which the letters of the greeting has been cut out.

A single 100 watt bulb is located in each compartment and wired to the circuit breaker or flasher unit. The scrim through which the lights shine may be painted any color desired and the snow and circles of the face of the sign are painted white and covered with several thick coats of Silicate of Soda, or water glass, to give them the glossy appearance of frozen snow and ice.

A ½-inch strip of spring brass, bolted to the Bakelite panel of the flasher unit, is forced into contact with the head of a brass bolt as diagram shows by the passage of a ½"x½"x1" wooden cleat screwed to the surface of the revolving drum. To complete the circuit and to light one letter of the sign at a time.

Great Inventions

[*Continued from page* 45]

bought in stationery shops. Its pages are provisionally gummed, and need only be moistened to make clippings adhere to them. Hunting for a paste pot was always disagreeable to Mark. His third invention, patented in 1885, was for a game to help the players remember important historical dates.

Few names are better known than that of Cornelius Vanderbilt, but few realize that three out of the four Americans who have borne it were inventors. The first Cornelius Vanderbilt who began as a farm boy on Staten Island and established the first ferry service between the island and Manhattan, became captain, then owner of the first steamboat to navigate New York Bay and the Raritan River to New Brunswick. Then he began to build steamboats of his own design.

His grandson, second of the name, was not of an inventive turn, but the great grandson, the family's present head, General Cornelius Vanderbilt, is well known among railroad men for his inventions. He was trained as a mechanical engineer, and the Vanderbilt locomotive firebox has been for years standard equipment.

The latest Cornelius Vanderbilt, the General's

[*Continued on page* 136]

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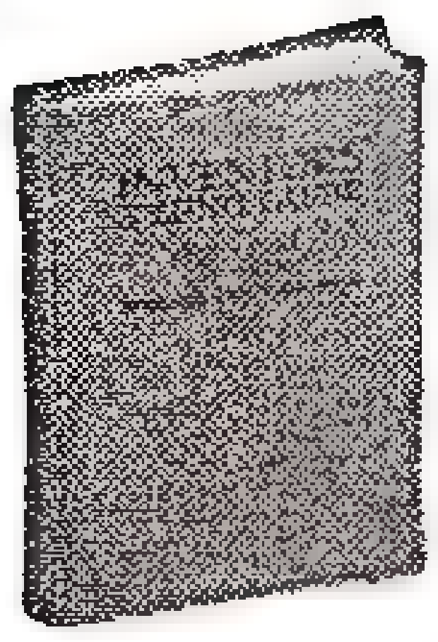

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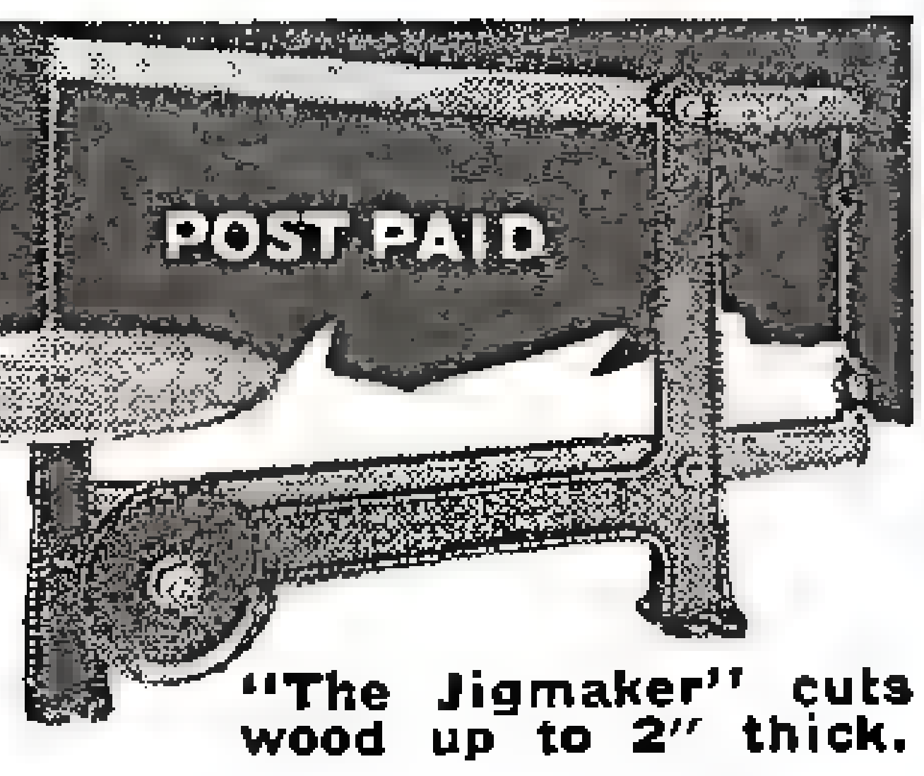

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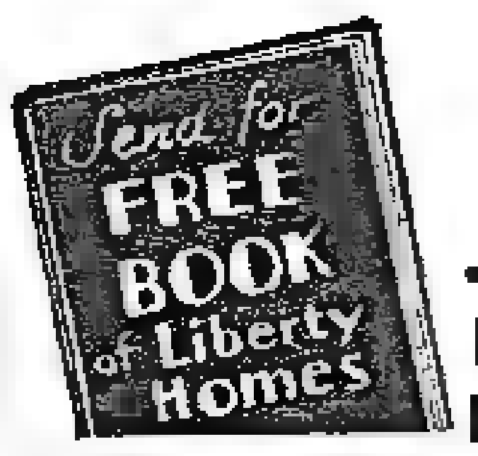

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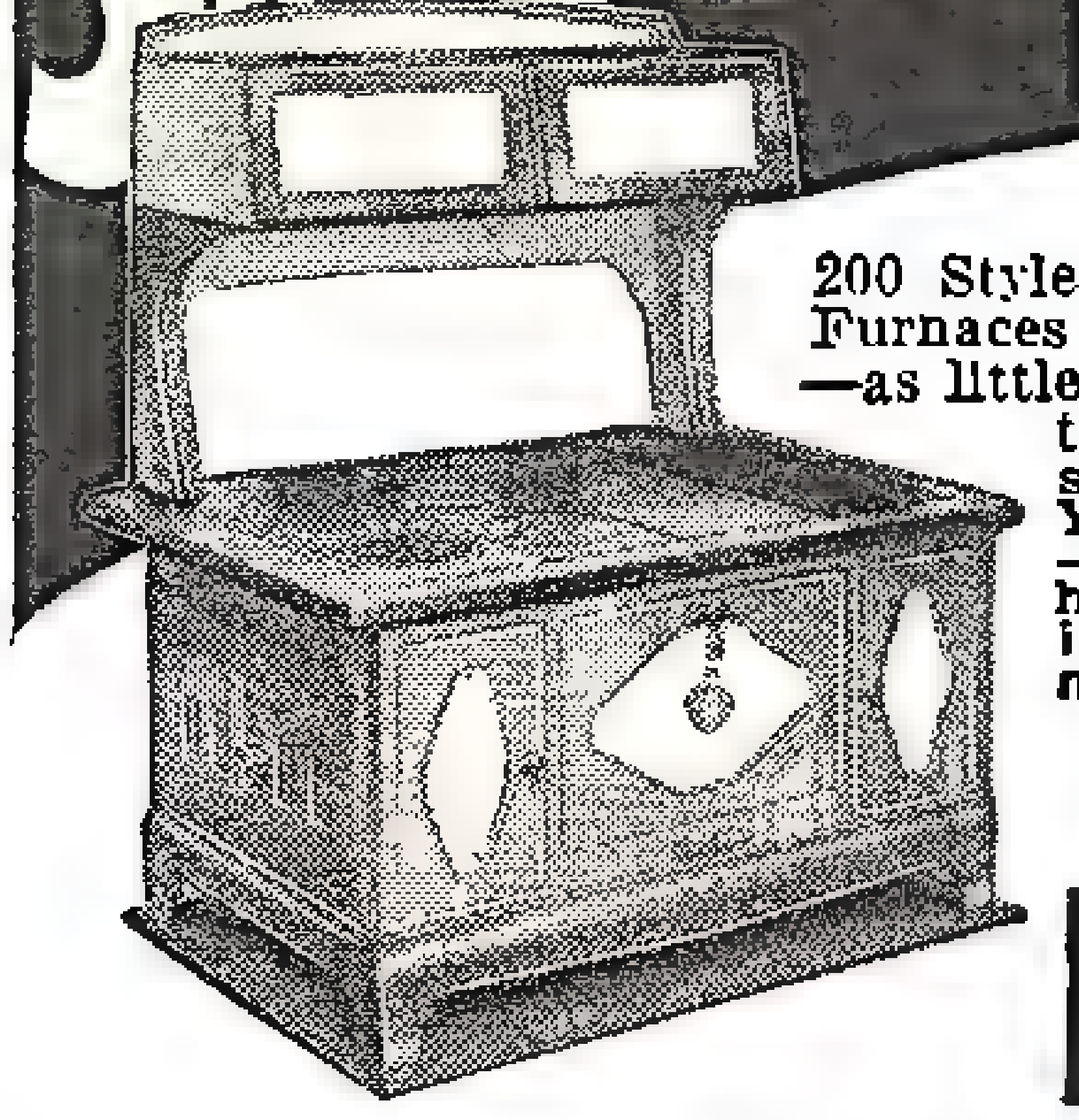

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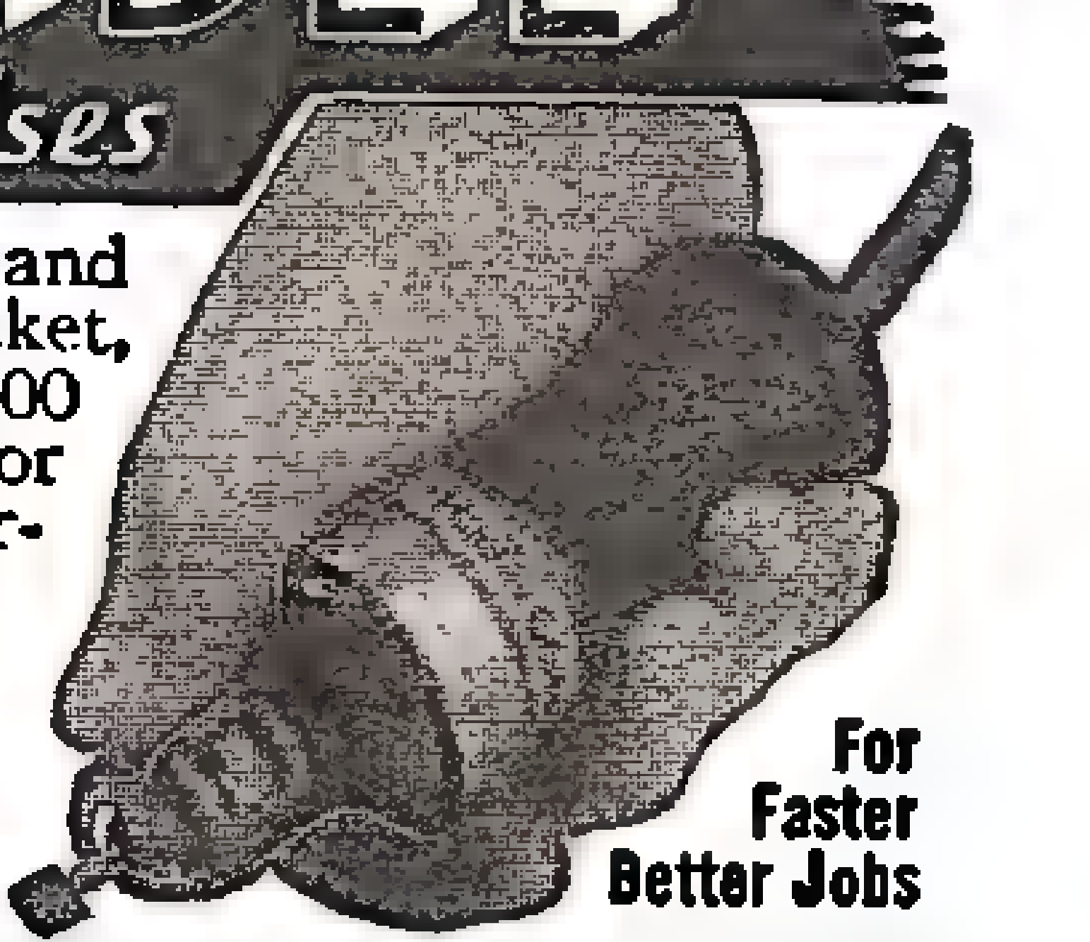

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Great Inventions

[*Continued from page* 134]

son and well-known journalist, figures in the Patent Office as the inventor of a shoe-polishing device. The device is about the size of a large fountain pen. Inside the barrel is a polish which feeds into a brush attached to one end, while concealed within, wound up like a roller shade, is a polishing cloth.

Colonel John Jacob Astor, who went down with the Titanic, patented a device for cleaning macadam roadways, doubtless arising from his experience with dusty roads about his country place at Rhinebeck-on-the-Hudson. It worked on the general principle of a vacuum cleaner. The Colonel dedicated his invention to the free use of the public, this gallant gentleman, like Washington and Jefferson, disdaining to accept money for his invention.

Colonel Charles A. Lindbergh and Dr. Alexis Carrel, author of the book-hit—"Man, the Unknown," have invented and are now testing out an artificial heart with synthetic blood stream, which aims to make it possible to keep vital organs alive and functioning outside the body.

Even royalty dabble in invention. Prince Henry of Prussia, brother of the former Kaiser, took out a United States patent on a "windshield wiper" just three months before the World War began.

Princess Elain von der Lippe-Lipski, now residing in Washington, is quite a prolific inventor. Recently three patents were granted her in a single day. One of these inventions, the Princess explained, involves usage of the red and violet rays to work with medical preparations by which surgical wounds that have taken as long as forty-five days to heal can be closed in from seven to ten days. Another is an automobile headlight which brightens and dims itself automatically.

The theater is well represented, too. Both Harry Houdini and Howard Thurston, magicians, knew that the only way to stop new-comers from taking the fruits of their labors was to patent the illusions which they performed.

Will Mahoney, of vaudeville fame, patented that odd musical instrument, the Mahoney-phone. And Jimmy Durante was able to register a trademark consisting of the word "Schnozzle," associated with his photograph and signature.

Charles Ray, the motion picture idol of a decade ago, is the originator of auto turn and stop signal lights, for which he received a patent as far back as 1919. The numerous patents to William Fox and David Wark Griffith, as might be expected, relate to photography and motion picture production. Lee de Forest, of radio fame, has been outstanding in the development of talking pictures.

Newton D. Baker, Secretary of War under President Wilson and a noted Cleveland attorney, last year patented a suction cleaner for

[*Continued on page* 138]

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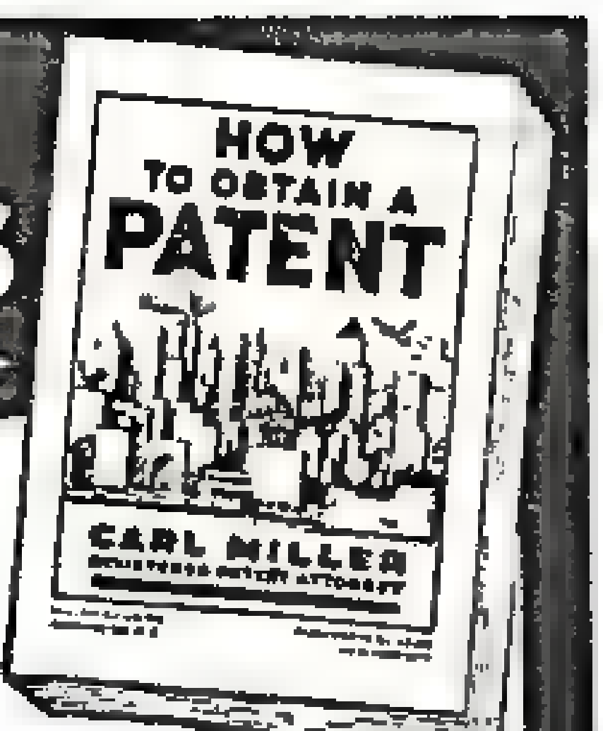

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Great Inventions

[*Continued from page* 136]

the dusting of books in cases. It is now being manufactured. Another attorney, Herbert L. Satterlee, brother-in-law of J. P. Morgan and former Assistant Secretary of the Navy, maintains a private laboratory in which he works on X-Ray and radio inventions.

Admiral Bradley A. Fiske, one of the heroes of the battle of Manila, since his retirement, has strayed from his chosen field to the extent of patenting several systems and apparatus for printing in extremely small characters, to be read through microscopes mechanically fed along the printing at any desired speed. The arrangement was intended to conserve space.

As the Marines always bob up where there is activity, it is not surprising to find General Smedley D. Butler was one of the pioneers in range finding apparatus.

That Arde Bulova takes out a patent for improvements in watches, or A. J. Reach for a baseball mask, or that Dr. Vannevar Bush patents an improved radio system, is hardly news. Neither is it news when Henry Ford patents another improvement in automobile structure; but few are aware that he has patented 100 such devices.

It was as late as 1930 that the patent laws were extended to embrace certain new forms of plant life. Among the first patents granted under the amended law was one to Harold L. Ickes, now Secretary of the Interior, for a dahlia. Two other plant patents have subsequently been granted to Mr. Ickes. As fate would have it, the new law took effect so near the end of Luther Burbank's career that only one patent was awarded him and that was granted after his death.

Women as inventors run largely to feminine or juvenile devices. Thus, Mrs. Winifred (Hudnut) Guglielmi professionally known as Natacha Rambova, patented a combined coverlet and doll shortly before the death of her famous former husband, Rudolph Valentino.

Mrs. Horatio Nelson Slater, famed as a leader in New York society, patented over twenty inventions. The profit from her inventions has been devoted to charity. Several of Mrs. Slater's patents relate to dolls. She also patented a military blanket, an automatic ice-case for refrigerators, a book cover and a couch and chair.

Other women have worked entirely in man's field. Mrs. Martha J. Coston invented the flare light used by mariners all over the world. Maude Adams, actress, has given much research and energy in attempting to develop motion pictures producible in daylight.

There is Miss Beulah Louise Henry, of New York City, who has received the soubriquet of "Lady Edison" for her many inventions, ranging from football valves on through a new type of sewing machine. Though her total of fifty patents may seem small compared with those of male

[*Continued on page* 150]

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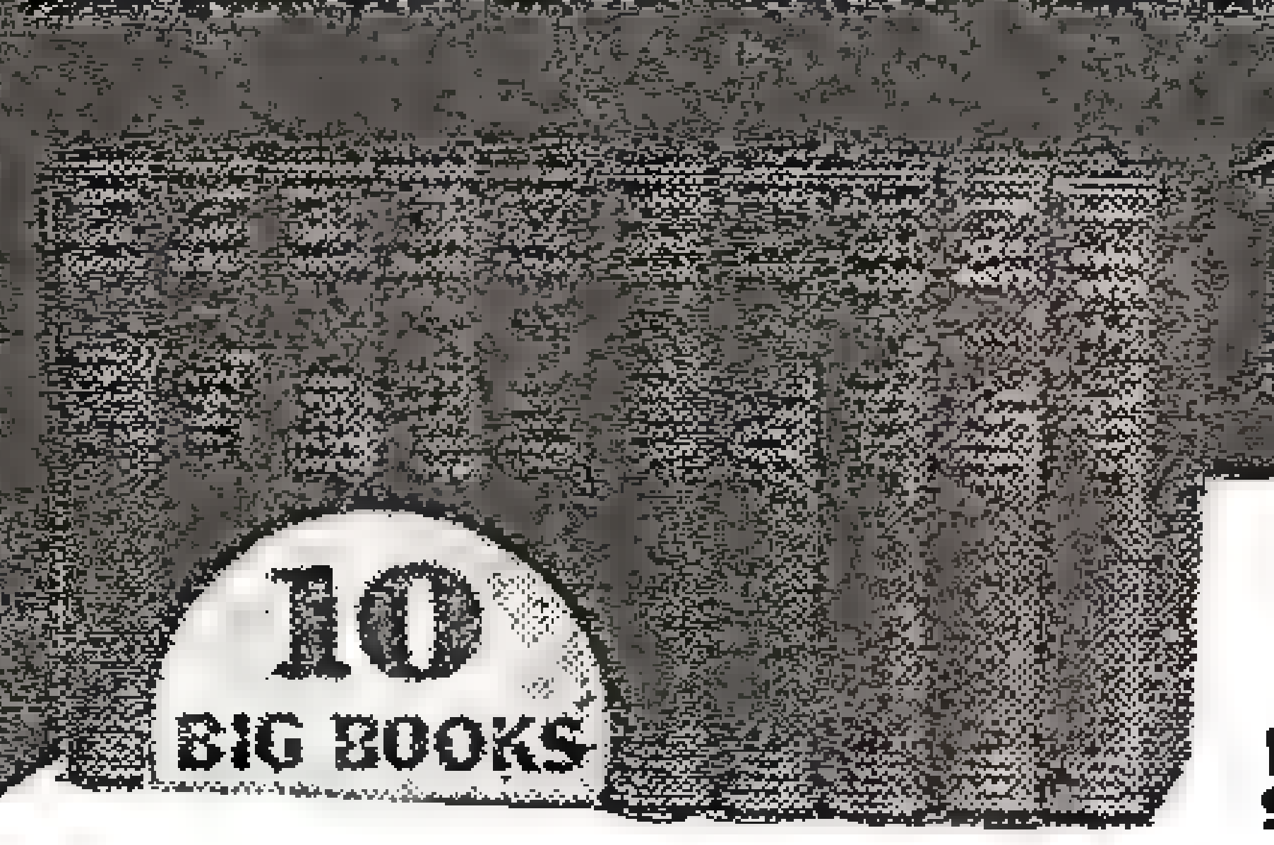

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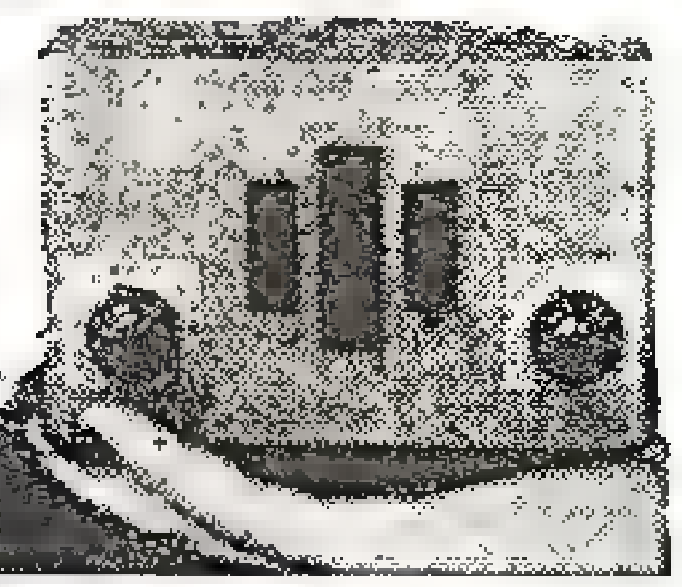

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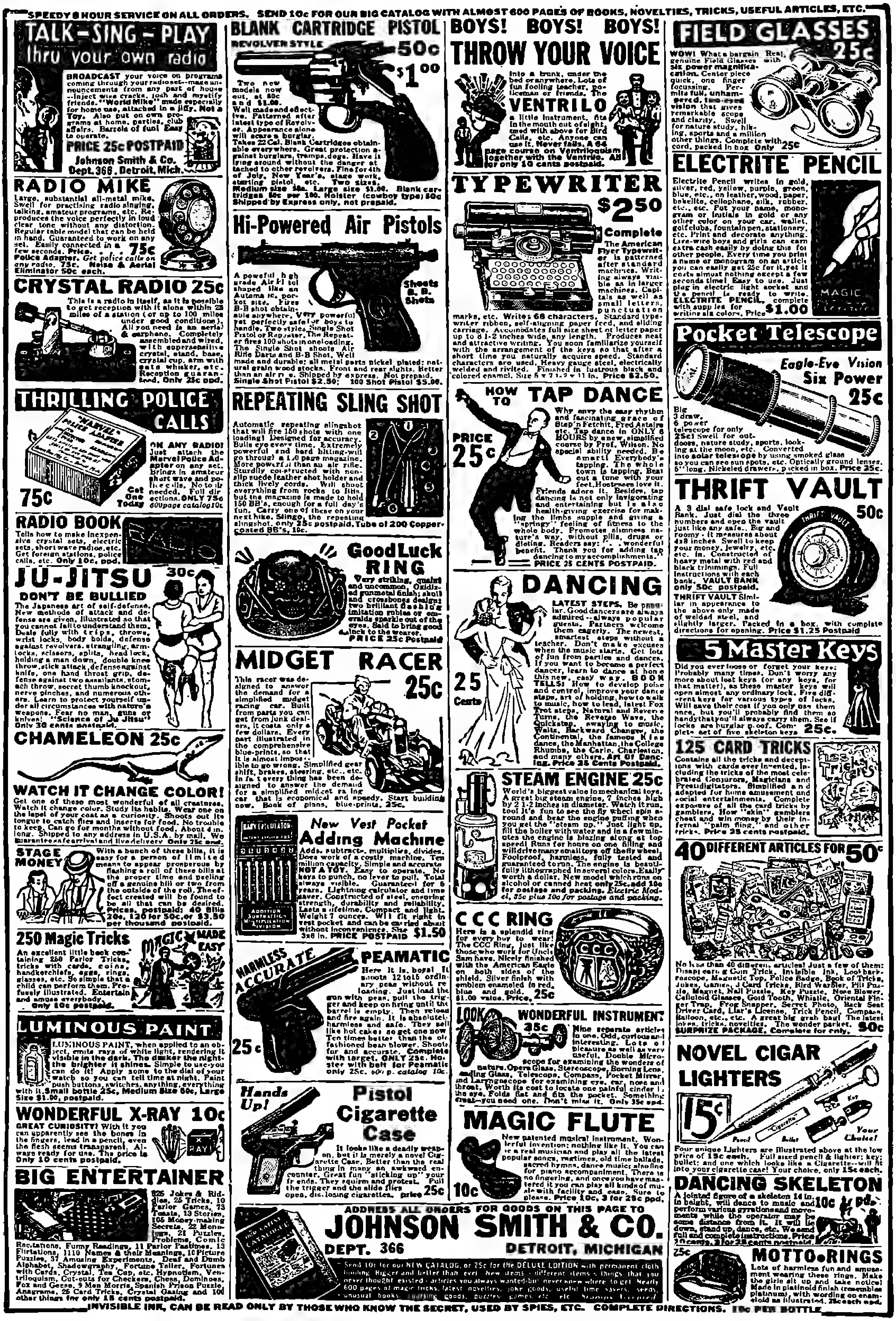

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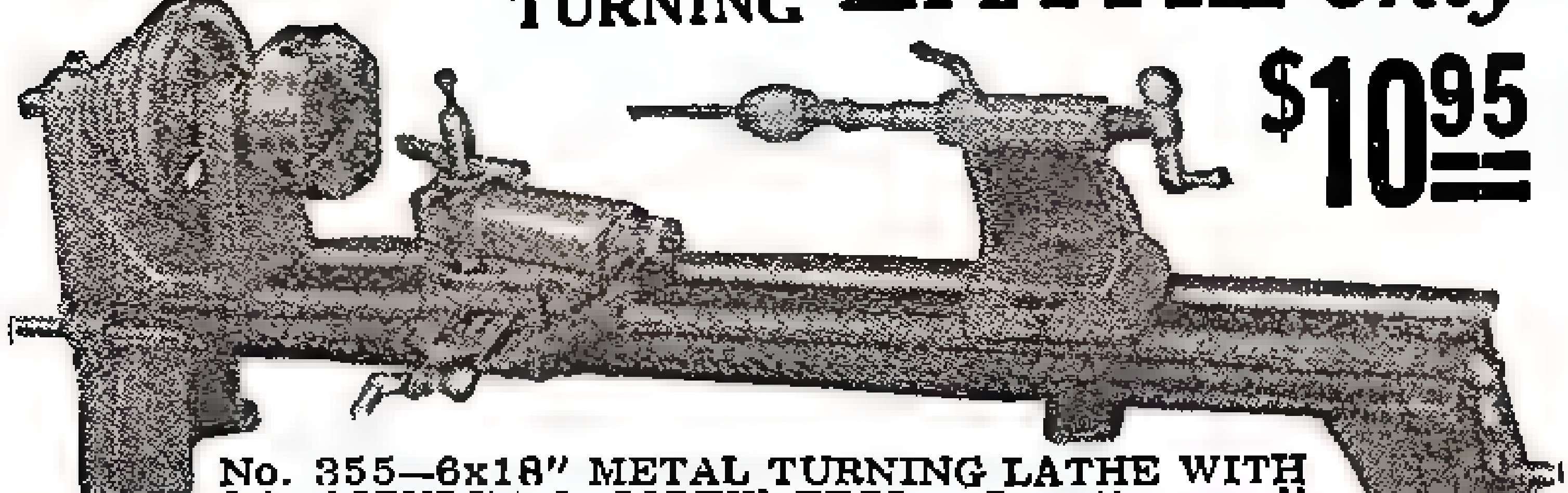

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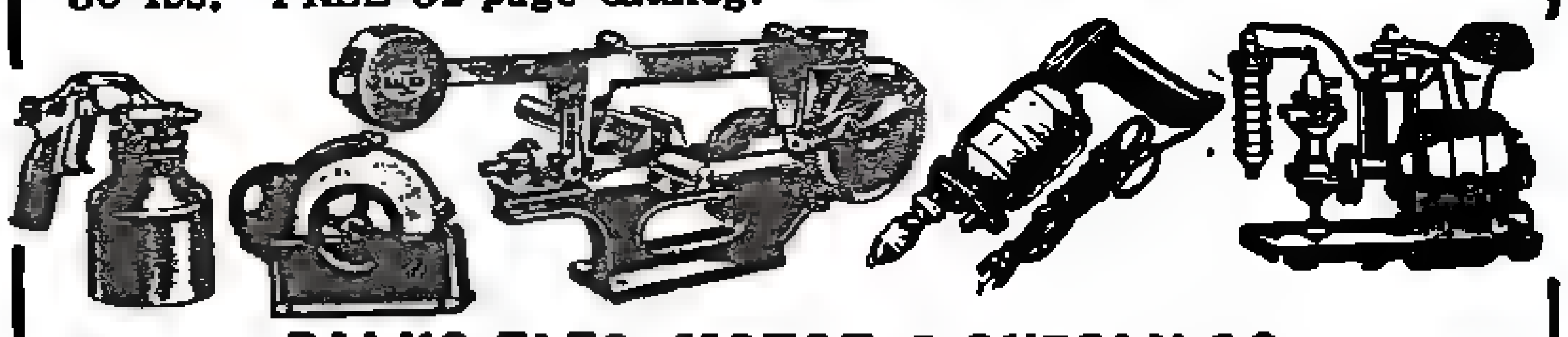

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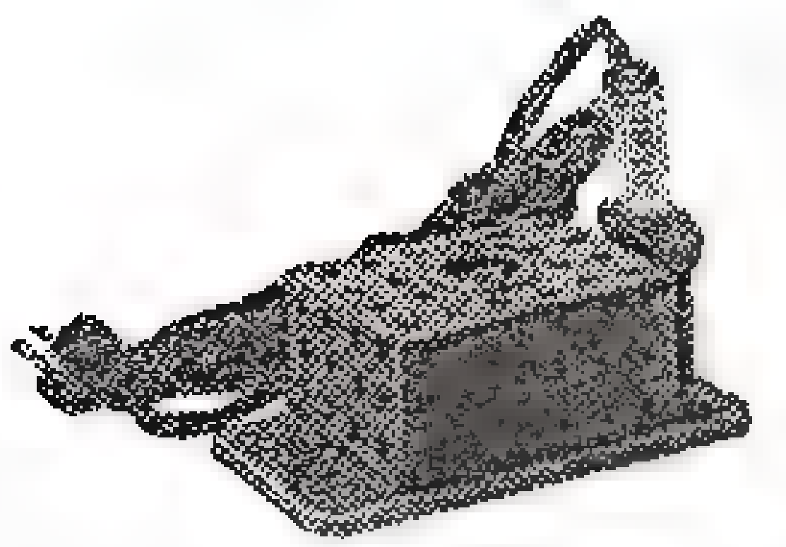

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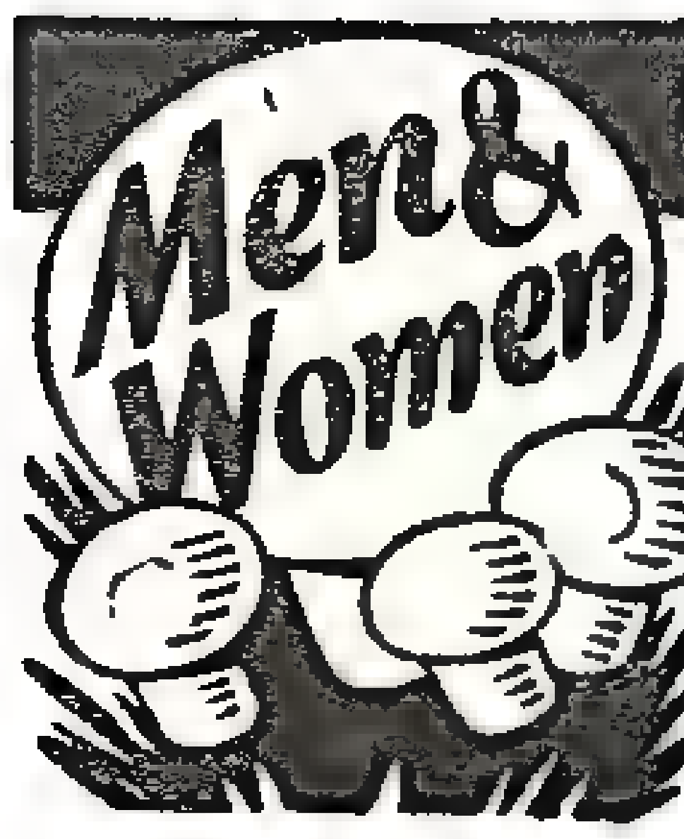

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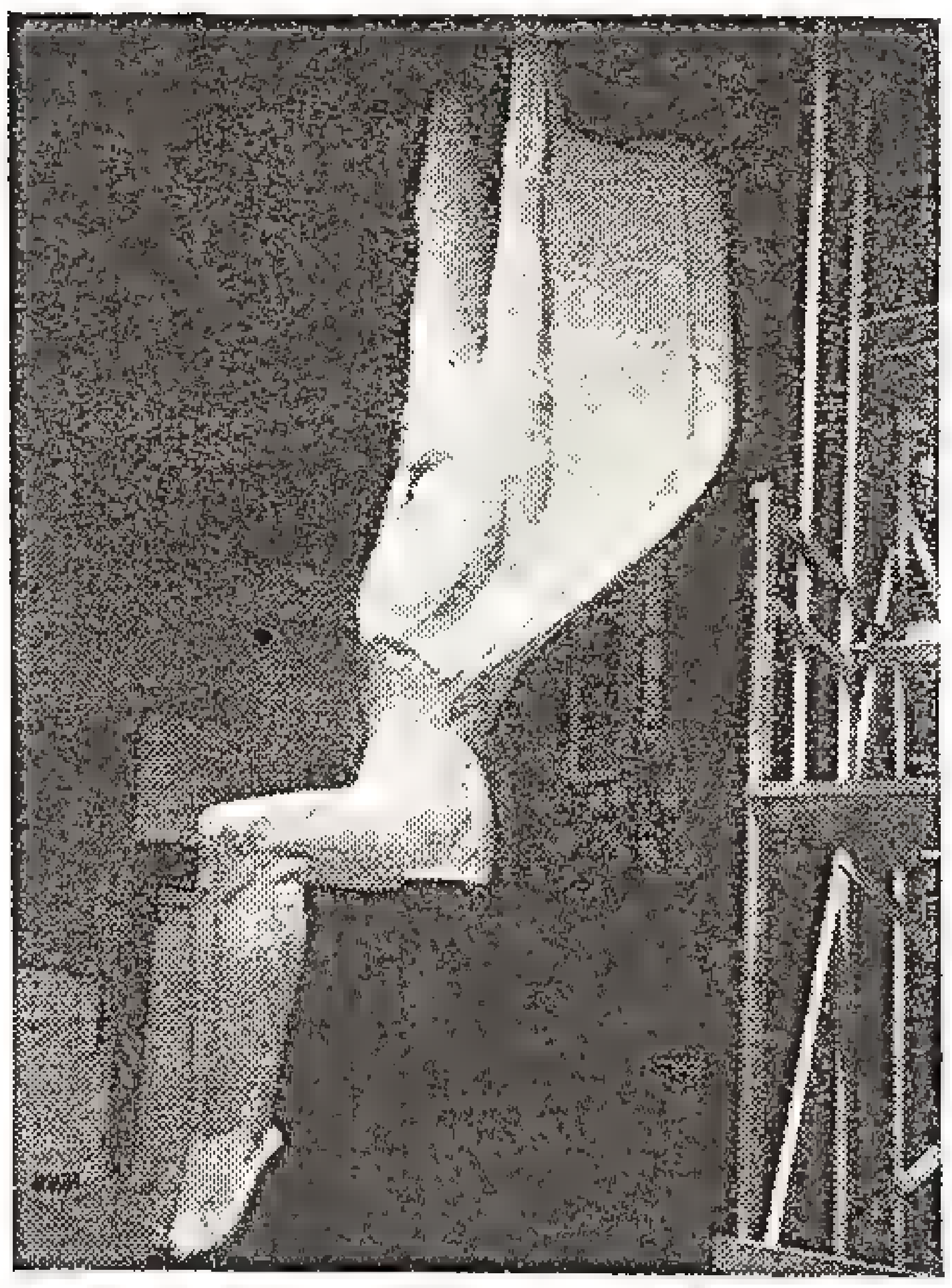

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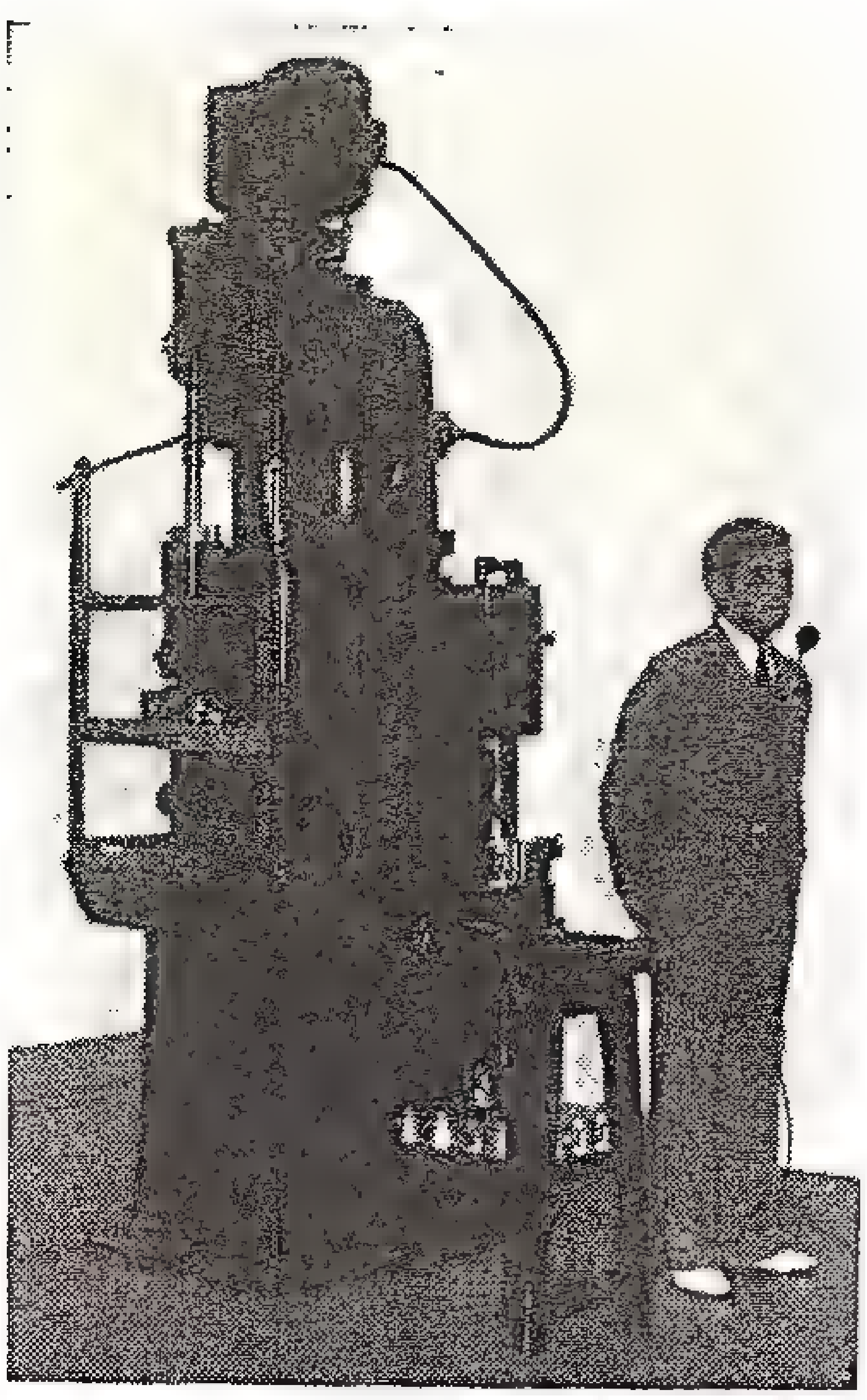

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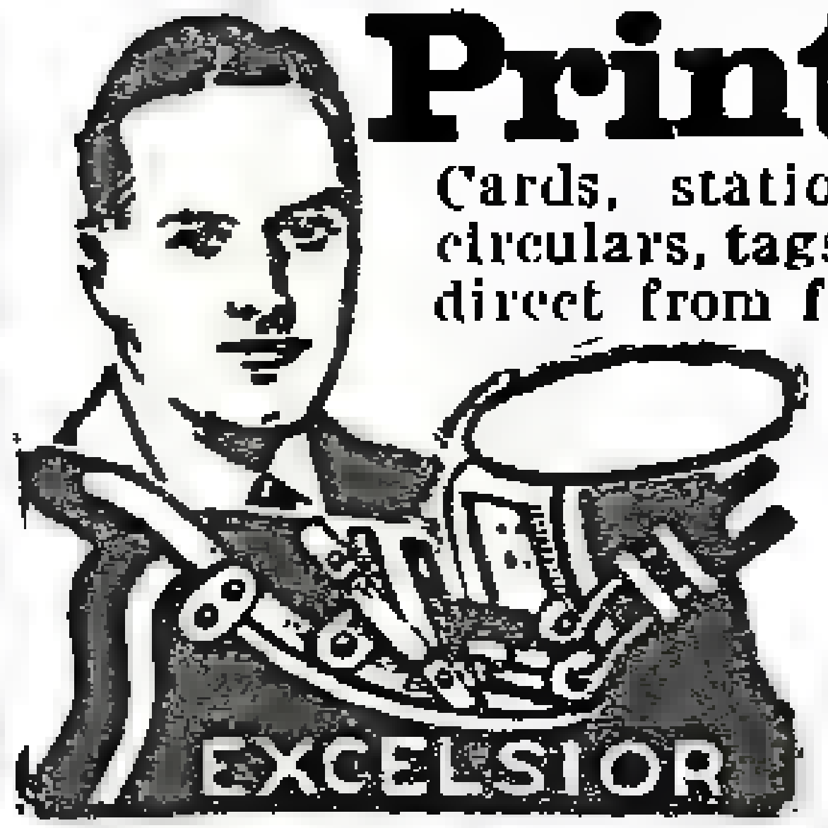

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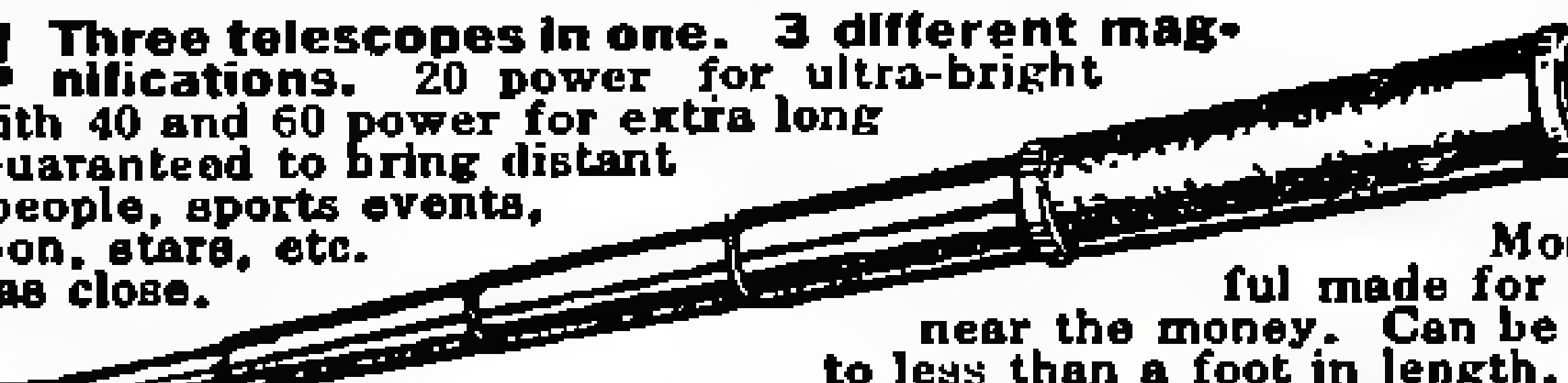

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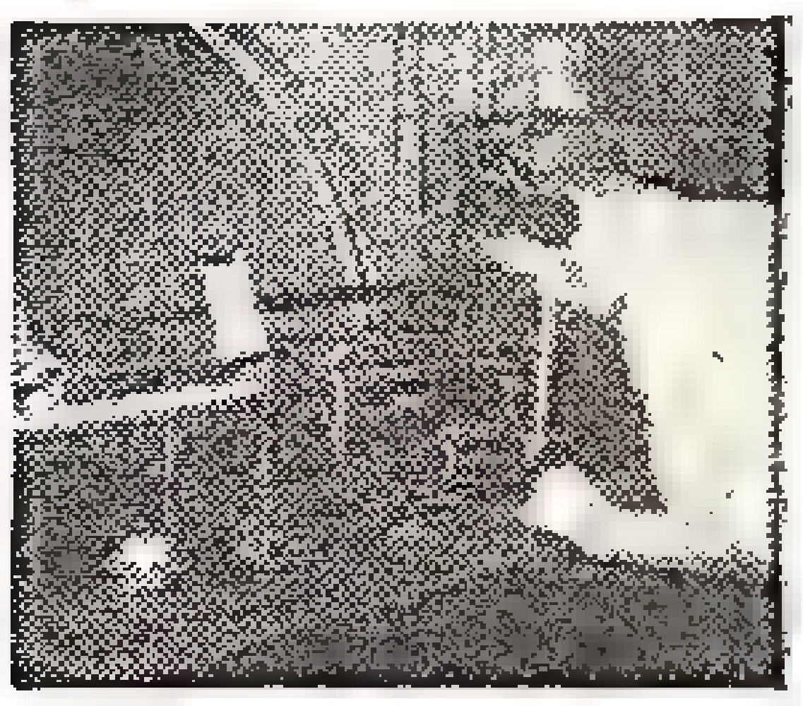

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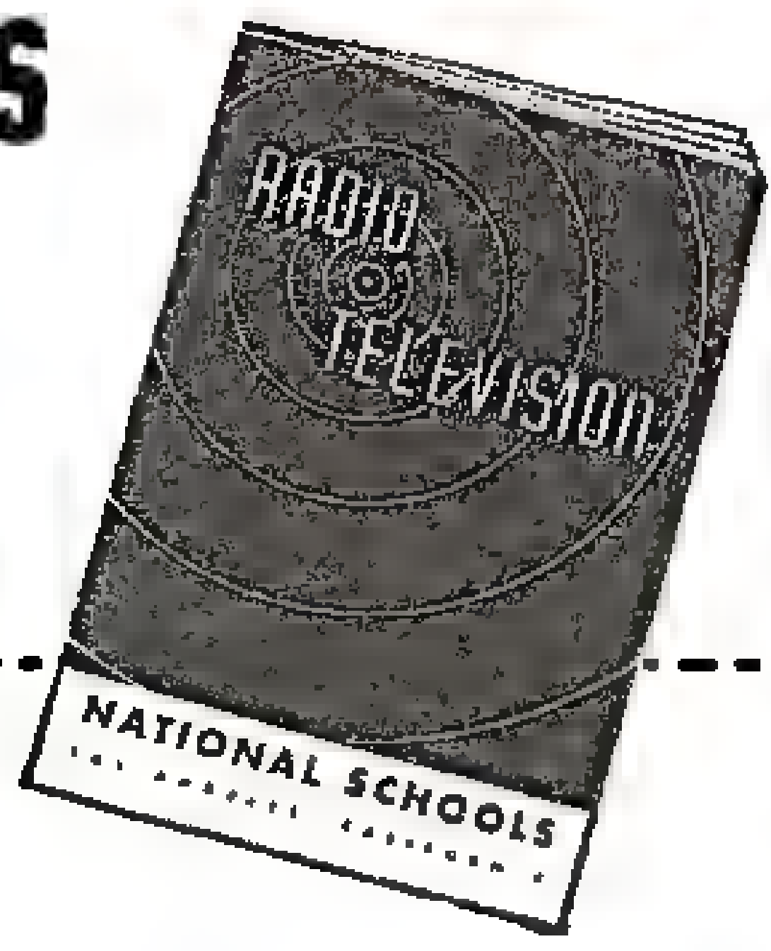

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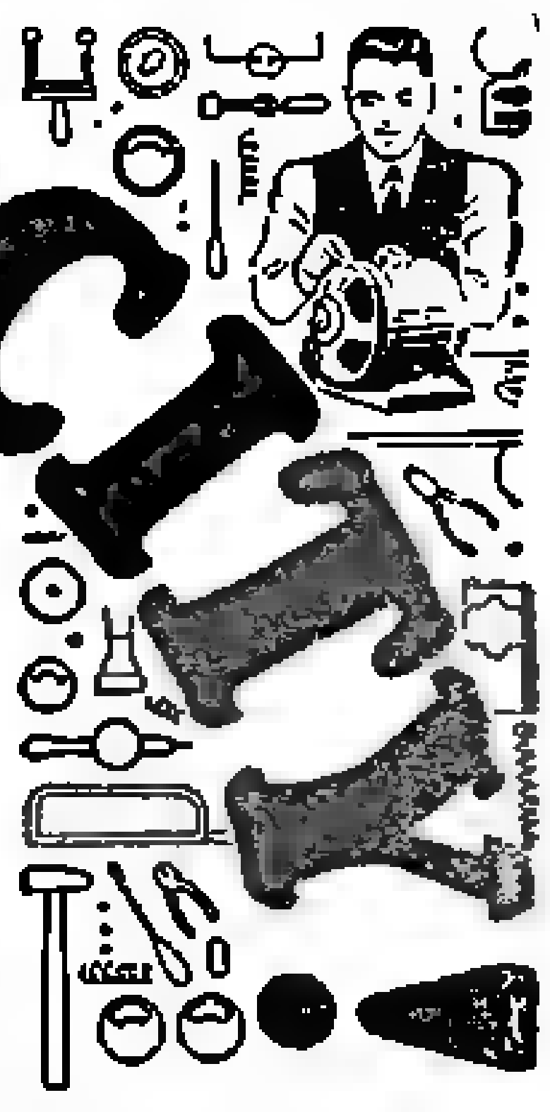

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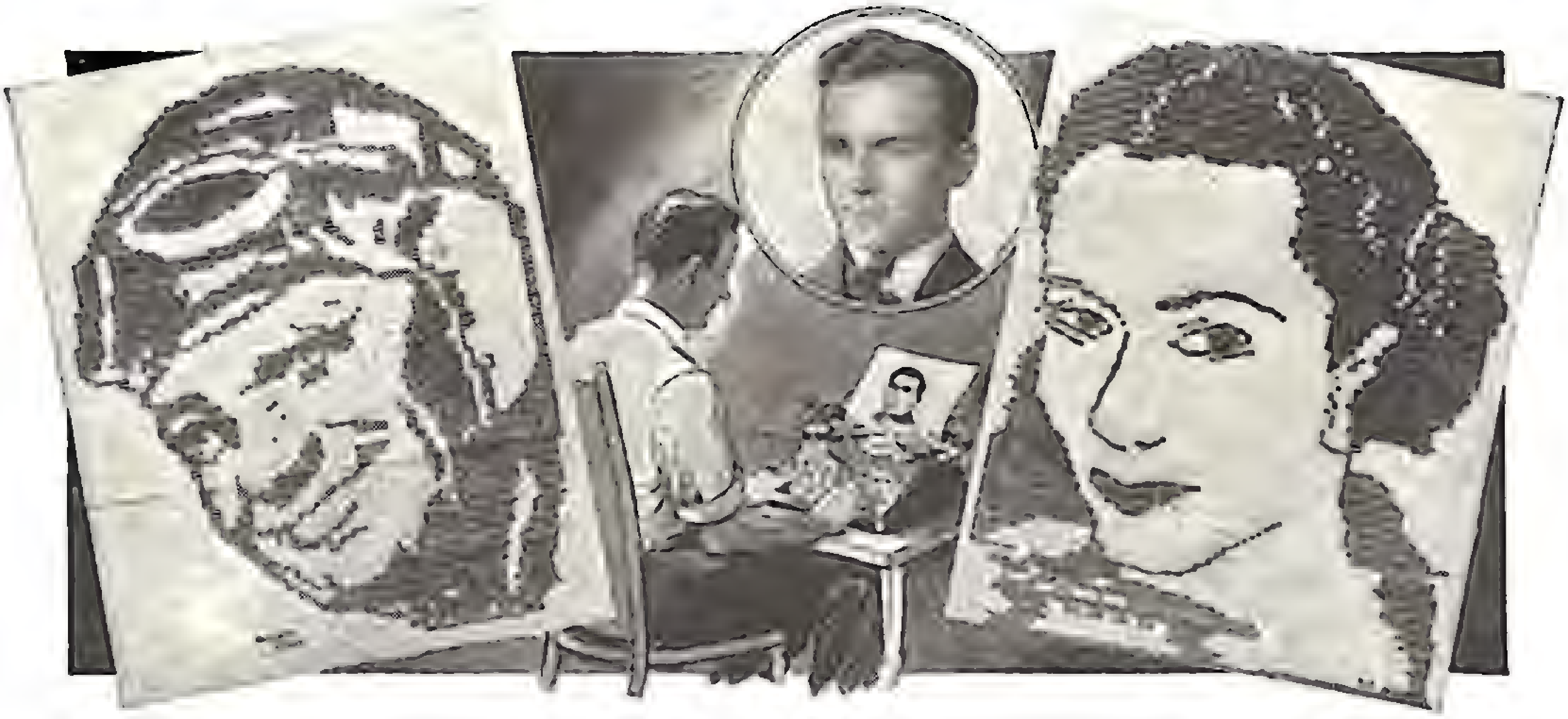
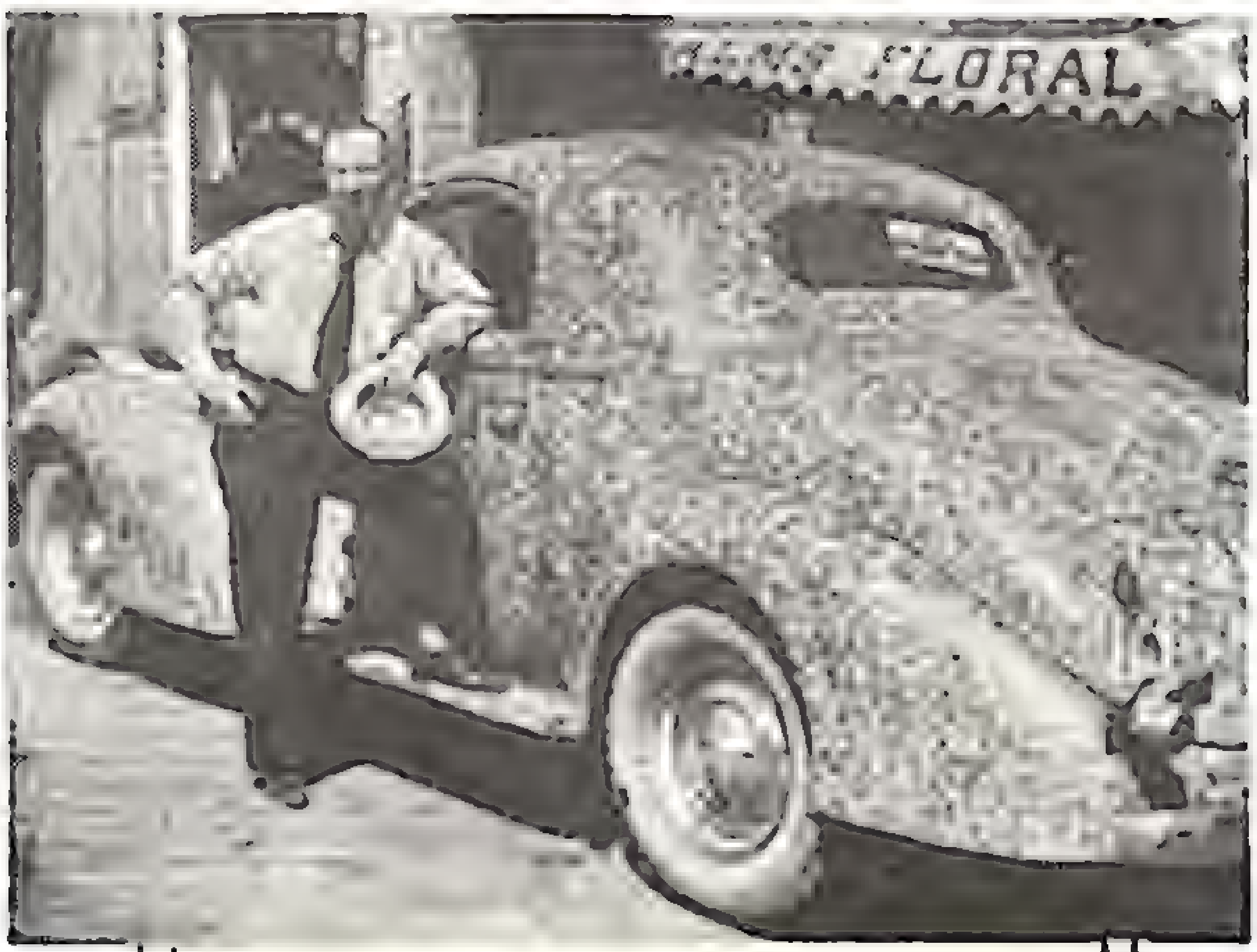


Using nothing but a typewriter Ben C. Woodall of Buffalo, New York, has produced striking type portraits of famous people, two of which are shown above. Many of Woodall's portraits are autographed. His prized ones include Fred Astaire, Herbert Hoover, Ben Bernie, Clark Gable, Rudy Vallee, Walter Winchell, Katherine Cornell, Howard and Jane Thurston, Claudette Colbert and others. Wallace Beery and Dolores Del Rio's portraits appear above with their creator shown in the circle.

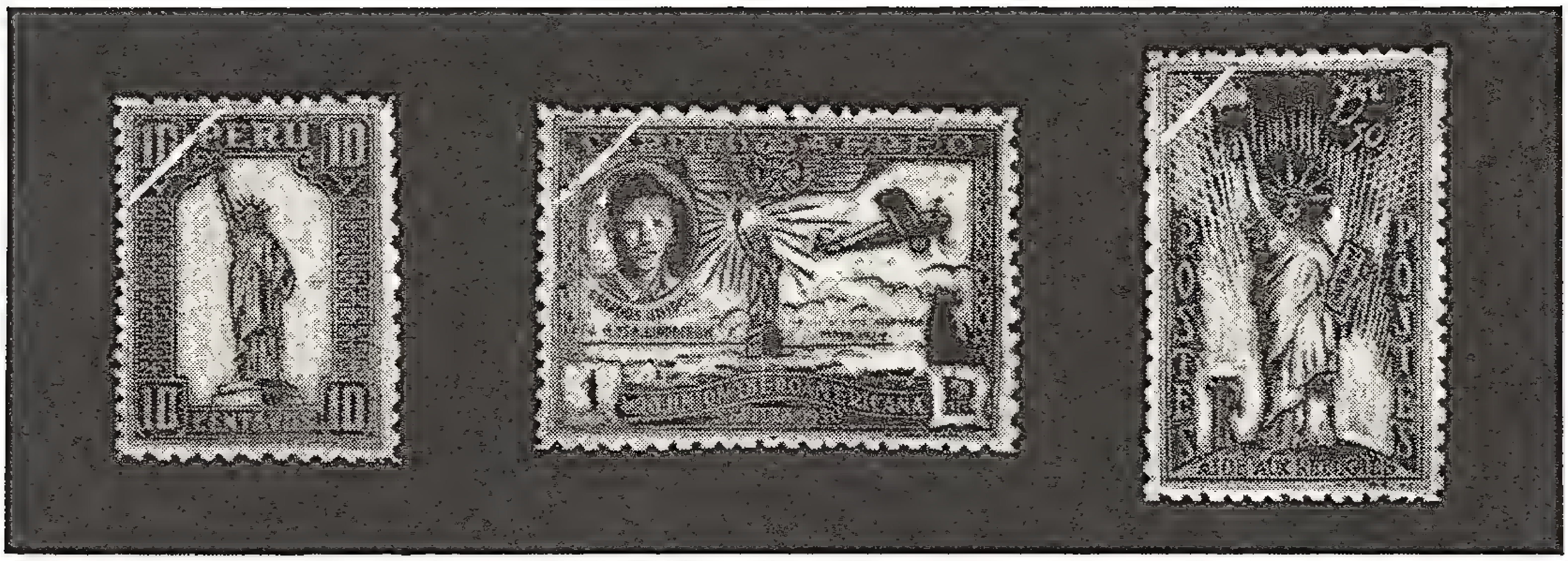


Ed Hadley, left, a business man of Casper, Wyoming, claims the distinction of possessing one of the most unusual of all stamp collections. The body of his car is the album for more than 10,700 postage stamps. Mr. Hadley engaged the services of five girls who worked six weeks pasting the postage stamps on the body, headlights and fenders of the car.

Henry Reider, left, member of the University of Nebraska Museum Staff spends his spare time gathering bones from prehistoric animals for use in making unusual musical instruments. He is shown with a xylophone which he made from rhinoceros rib bones.

When not on duty Harold Robinson, a Greenwich, Conn., traffic officer, operates amateur radio station W1BUN, communicating with fellow amateurs in all parts of the United States and Canada. Robinson along with other Eastern amateurs played an important part in handling messages from the flooded areas of New England last spring.

Foreign Stamps Commemorate Statue of Liberty



America's famous Statue of Liberty which on October 28, 1936 celebrated its Fiftieth Anniversary is not only pictured on the United States fifteen cent stamp, but on the stamps of four foreign countries as well. France, Spain, Uruguay and Peru have honored the world famous statue with special stamp issues, three of which are shown here. Although suggested for other U. S. stamps the government has limited its use to the black fifteen cent issue. The statue, which stands in New York's harbor, was presented to the U. S. by the French people in appreciation of assistance rendered them during the Franco-Prussian War.

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SUPER-WONDER Packet offered, containing 60 different stamps from Afghanistan, Transjordania, North Borneo, Manchukuo, Sudan, Macao, Iraq, Charkhari, French and British Colonies, including natives, beasts, ships, etc., all for 5c to approval applicants. Big illustrated lists included. Kent Stamp Company, Box 87-Z (G. P. O.), Brooklyn, N. Y.

50 DIFFERENT Stamps cataloging over $1.00 only a dime to approval applicants. 20,000 different stamps at prices ranging from 1c. All stamps guaranteed genuine. A fine selection of U. S. revenues at 1c and up. Address F. G. Stein, Dept. 214, 7360 N. Seeley Ave., Chicago.

GIANT Netherlands Commemorative Triangle, Jubilee, Airmails, Pictorials in Mammouth Collection—10c, with Double Premium Approvals. Free Airmail Collection given regular customers. Tru-Value Stamp Service, Box M1412, Hartford, Connecticut.

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Great Inventions

[*Continued from page* 138]

inventors, they loom large in comparison with others of her sex. Less than two per cent of the patents have been granted to women—a proportion practically constant since 1900.

In every branch of sport may be found famous athletes who have succumbed to the inventive urge. Walter Hagen patented a golf ball having a surface design which, he claims in his patent papers, makes the ball "accurate in flight as well as in putting and rolling."

Rene Lacoste, internationally known tennis player, has patented numerous inventions in racket structure. Sandow, the "strong man," devised a strength-measuring apparatus and patented it.

In baseball, player-inventors are almost as common as player-managers. If you have ever seen Max Carey, formerly of the Pittsburgh Pirates, slide into a base, you may have wondered what saved his hide. Well, Max always used a special sliding pad which he himself invented and patented.

On the other hand, the late Benjamin Shibe, owner of the Philadelphia Athletics, patented a mass of inventions on player equipment, including baseballs and baseball-making machinery. Thomas Shibe, late president of the Athletics, and John Shibe, now president of the club have both contributed inventions along the same line. In fact, it is under the Shibe patents and in the Shibe plant that the balls used by the American League are manufactured.

Charles Brickley, former Harvard football star and All-American fullback, is said to have been the greatest dropkicker of all time. He wore a patented shoe of his own invention.

From the side lines the coaches give thought not only to the plays, but to the equipment needed by the players. For instance, we might mention Glenn S. ("Pop") Warner, dean of coaches, whose patents include a "shoulder protector."

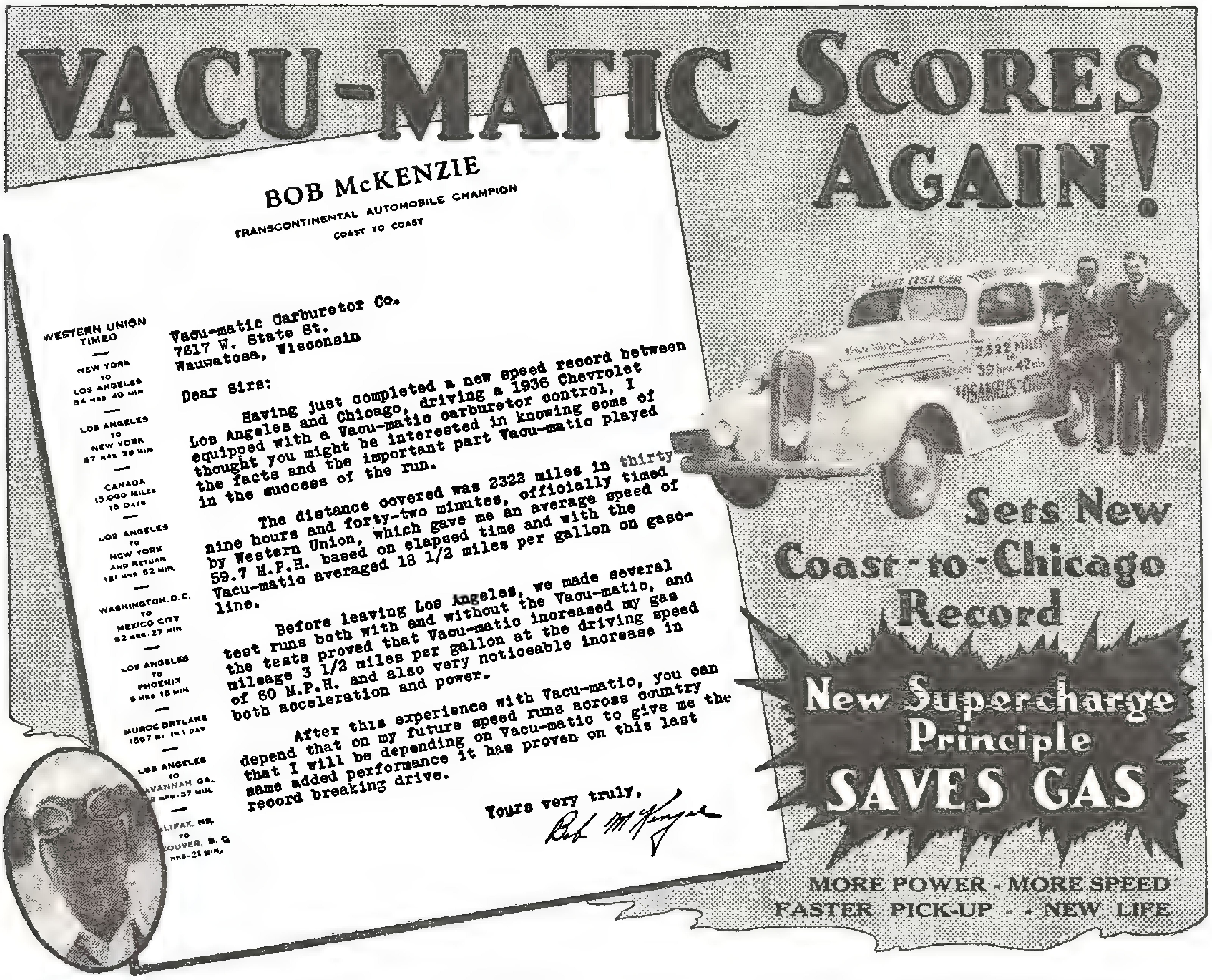
Around The World By Air

[*Continued from page* 53]

especially at high altitudes. A remarkable development in aviation which was not available until a few years ago is the "gear shift of the air"—the controllable pitch propeller operated from the engine oil pressure. And there are the new drives to operate vacuum pumps used to actuate retractable landing gears.

I marveled as I sat in the control cabins of airplanes and as great areas of geography were left behind beneath us I learned of down-draft carburetors, wing de-icers, the complete shielding of the ignition wiring system to prevent interference with radio reception, and many other aviation achievements.

[*Continued on page* 153]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2322 MILES
39 hrs 42 min
Sets New Coast-to-Chicago Record
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SAVES GAS
MORE POWER - MORE SPEED
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TRANSCONTINENTAL AUTOMOBILE CHAMPION
COAST TO COAST

WESTERN UNION
TIMED

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LOS ANGELES
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13,000 MILES
15 DAYS

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92 HRS. 27 MIN

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MUROC DRYLAKE
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LOS ANGELES
TO
AVANNAH GA.
HRS.-37 MIN.

LIFAX, NS.
TO
OUVER, B.C
HRS-21 MIN.

Vacu-matic Carburetor Co.
7617 W. State St.
Wauwatosa, Wisconsin

Dear Sirs:

Having just completed a new speed record between Los Angeles and Chicago, driving a 1936 Chevrolet equipped with a Vacu-matic carburetor control, I thought you might be interested in knowing some of the facts and the important part Vacu-matic played in the success of the run.

The distance covered was 2322 miles in thirty nine hours and forty-two minutes, officially timed by Western Union, which gave me an average speed of 59.7 M.P.H. based on elapsed time and with the Vacu-matic averaged 18 1/2 miles per gallon on gasoline.

Before leaving Los Angeles, we made several test runs both with and without the Vacu-matic, and the tests proved that Vacu-matic increased my gas mileage 3 1/2 miles per gallon at the driving speed of 60 M.P.H. and also very noticeable increase in both acceleration and power.

After this experience with Vacu-matic, you can depend that on my future speed runs across country that I will be depending on Vacu-matic to give me the same added performance it has proven on this last record breaking drive.

Yours very truly,
Bob McKenzie

ESTABLISHING new mileage records on cars in all sections of the country, the Vacu-matic again scores in a new speed record established by Bob McKenzie transcontinental automobile champion. Los Angeles to Chicago — 2,322 miles in 39 hours and 42 minutes— driving 75 and 80 to maintain a speed average of 59.7 miles per hour!

Here is speed—a gruelling grind—where quick accelaration, greater top speed — and less stops for gasoline mean those precious moments saved that make new speed records possible

The same Vacu-matic that helped Bob McKenzie establish this speed record and gave him such fine gas savings is now available for all car owners. It is positively automatic—simple to install—inexpensive—and pays for itself many times over in gas savings.

Automatic - - Nothing Like It!

Vacu-matic is *entirely different!* It operates on the supercharge principle by automatically adding a charge of extra oxygen, drawn free from the outer air, into the heart of the gas mixture. It is entirely AUTOMATIC and allows the motor to "breathe" at the correct time, opening and closing automatically as required. No idling troubles—no carburetor adjustments necessary. It is so simple it will amaze you—so practical it will save you many dollars on gas costs.

Agents and Salesmen

VACU-MATIC offers a splendid opportunity for unusual sales and profits. Valuable territories now being assigned. Check and mail coupon.

Fits All Cars

VACU-MATIC is constructed of six parts, assembled and fused into one unit, correctly adjusted and *sealed at the factory*. Nothing to regulate. Easily attached in ten minutes.

The VACU-MATIC Co. **Wauwatosa, Wis.**

Guaranteed Gas Savings

VACU-MATIC must prove itself on every car. It is guaranteed to give worthwhile gas savings, quicker pick-up and more power, or it costs you nothing. "On my V-8 Ford it works miracles", says Ralph Fields. James Seeley —"On an International Truck on a round trip to Cleveland, 385 miles, it saved 19 gallons of gas." A. V. Grove —"On the Buick it showed 5 miles more per gallon." F. S. Peck—"I average 22 miles per gal. on my Plymouth, an increase of 7 miles, for a saving of $15.00 a month, or $180.00 a year." Wm. Lyons—"Averaged 25 miles on a gal. with a Model A Ford at 40 miles per hour."

Free Details

You owe it to yourself to know all about this remarkable discovery. Mail the coupon below. Start saving gas with VACU-MATIC and enjoy a new driving thrill! There's no obligation—so get the facts now! Write today!

FREE OFFER COUPON

THE VACU-MATIC COMPANY
7617-271 W. State St., Wauwatosa, Wis.

Gentlemen: Please send me full particulars concerning the Vacu-matic and details of your Free Offer. This of course does not obligate me in any way.

Name ....

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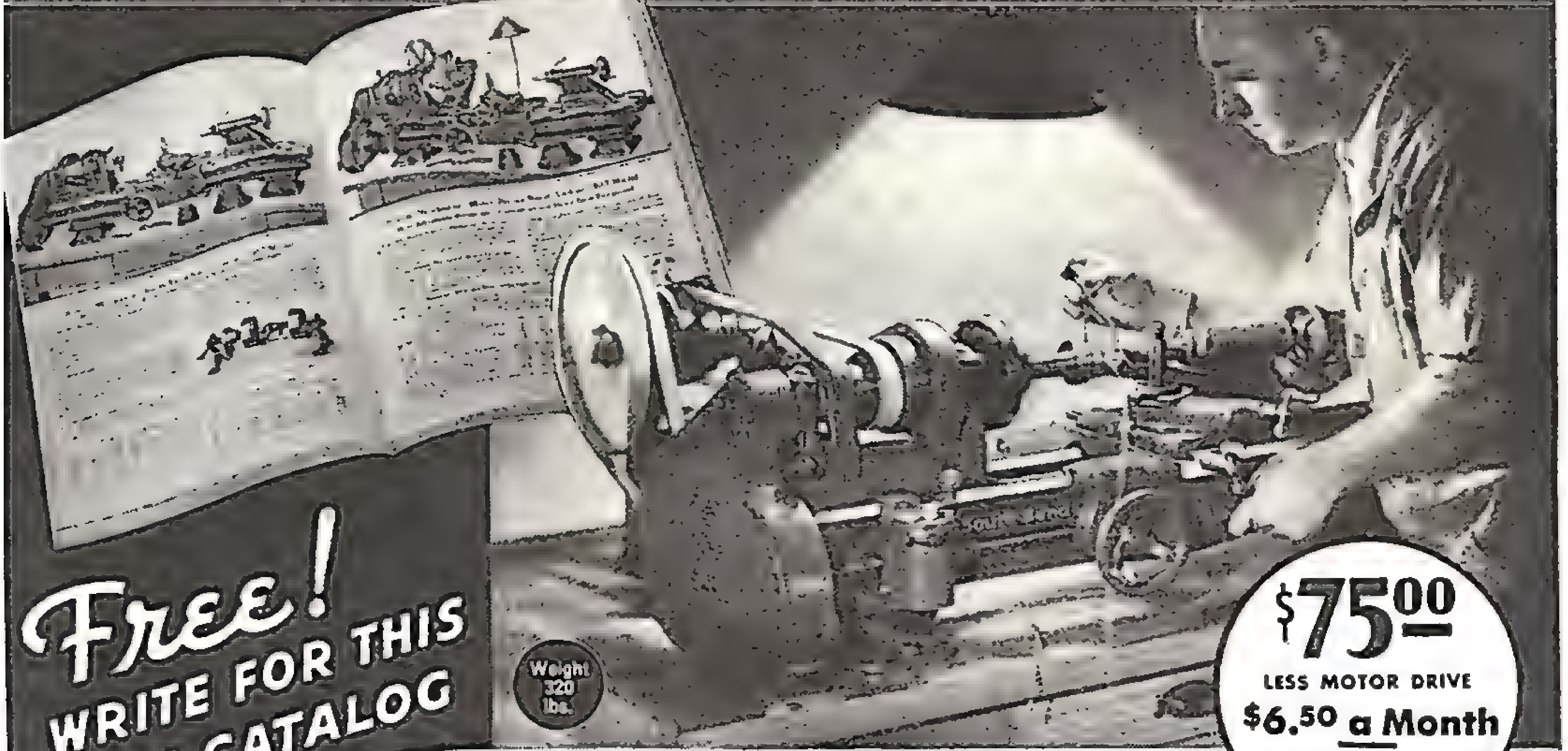
☐ Check here if interested in selling proposition.

New 1937 SOUTH BEND *Back-Geared Screw Cutting* PRECISION LATHES



Free! WRITE FOR THIS NEW CATALOG 15 K

$75.00 LESS MOTOR DRIVE **$6.50 a Month** AN IDEAL XMAS GIFT

No. 415-YA 9⅛″ swing by 3′ bed Workshop Bench Lathe with Horizontal Motor Drive, ¼ h.p. Reversing Motor, Switch and belt tension countershaft as shown above **$104**
($28 Down, $7 a month for 12 months)

THE new 1937 model 9-inch Workshop Lathe is a Back-Geared Screw Cutting Precision Lathe, with Twin Gear Reverse to lead screw, Ball Thrust Bearing on Spindle, Longitudinal Screw Feed to Carriage, Precision Lead Screw for cutting screw threads—and scores of other important features.

Especially recommended for fine accurate work in the plant, shop and toolroom. Used by all important industries in this country and abroad. Takes 38 practical attachments for milling, grinding, draw-in collet chuck work, and many other manufacturing jobs.

Write for Catalog 15K, illustrating and describing the new 1937 Model Workshop Lathe in 8 different drives—4 bed lengths. Shows the 38 attachments for use with this lathe. A valuable booklet to anyone interested in metal working lathes.
Use coupon below.

5 OTHER SIZES
9″, 11″, 13″, 15, 16″
SWING.
IN ALL BED
LENGTHS
PRICED
$87 to $200.

No. 192-C 16″ x 6′ South Bend Quick Change Gear Underneath Belt Motor Driven Lathe with 3-phase motor, reversing switch, complete as shown. Weight 2300 lbs. **$779**
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SOUTH BEND LATHE WORKS
514 E. Madison Street
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South Bend Lathe Works,
514 E. Madison St.,
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Please send me your new 1937 Catalog 15-K.
Size of lathe interested in ....
Class of work ....
Name ....
Address ....State....................
City ....

SOUTH BEND *Precision* LATHES

Around The World By Air

[*Continued from page* 150]

The down-draft carburetor guarded against dirt getting into the engines by taking the carburetor intake air from the top of the motor instead of at the bottom where great clouds of dust were churned up when the plane taxied along the ground.

To attempt to look ahead in the aviation industry literally takes one's breath away. I thought, as I traveled, that I was flying in the last word in heavier-than-air planes. Now I am learning of engines of 1,000 horsepower. More than 600 Wright engines of 1,000 horsepower have been ordered by the United States Army Air Corps for the new Boeing and Douglas bombers now being built to increase the strength of American military aviation. These new power plants have a fuel consumption which closely approaches that of a Diesel engine. The Dutch have ordered new airliners to be equipped with 1,000 horsepower engines. American Airlines and TWA will use them in this country.

Behind the scenes in all these development are advances in manufacturing. One of these revealed to me was the nitriding of the interior of cylinders in which the pistons move up and down. As the results of nitriding, the hardness of the cylinder interiors has been increased three times. They become so hard they will cut glass. This, of course, means that the cylinder walls have great wear resistance and will last materially longer.

Then there is magnafluxing. Manufacturers, after machining and polishing each steel part for an airplane motor—magnetize it. Then they immerse it in an oil solution which has fine iron particles kept in suspension by an air agitator. If there is a surface crack or defect in the steel, the edges of the break form the two poles of a magnet and attract the iron particles. Hence, the break is shown by a thin black line. Defects which might not be discernible even under a microscope of 10 to 20 diameter enlargement strength are clearly shown up in magnafluxing.

Materials for MM Homes

[*Continued from page* 39]

cellar. Mary felt that they should have real ground-breaking ceremonies, like those which are held for million dollar public buildings. The event was going to be that important to her and Tom, anyhow! (*To be continued next month*)

MM HOME BLUEPRINTS

Four sets of complete working blueprints and specifications, ready to turn over to a contractor after advice from a local architect, can be obtained for $25.00 for either the $3,500 or the $5,500 home. Address orders to Modern Mechanix Publ. Co., Fawcett Bldg., Greenwich, Conn.

This MACHINISTS' Home-Study Course helps men get ahead

Newly assembled—specially priced—these five recent books give you the practical facts on modern machines, up-to-date methods you need to advance in machine shop work. Take advantage of the other man's experience as found in books, to solve your problems, increase your efficiency, with the new

Library of Modern Machine Shop Practice

5 volumes—2000 pages—1600 illustrations

(*A combined home-study course and reference library*)

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No money down—special price—easy payments

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Send me for 10 days' free examination the Library of MODERN MACHINE SHOP PRACTICE. If satisfactory I will send $1.50 in 10 days and $3 monthly until the special price of $16.50 is paid. If not wanted, I will return the books postpaid. (To insure prompt shipment write plainly and fill in all lines.)

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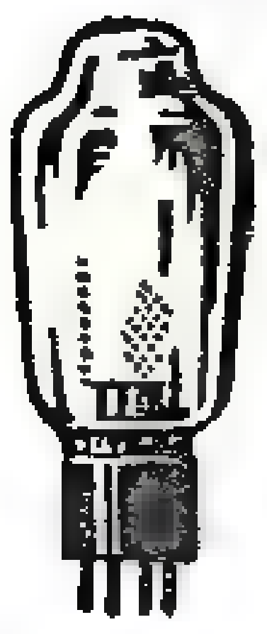

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holds rich rewards for trained men

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Dicing-Slicing-Shredding
Samuel J. Bell
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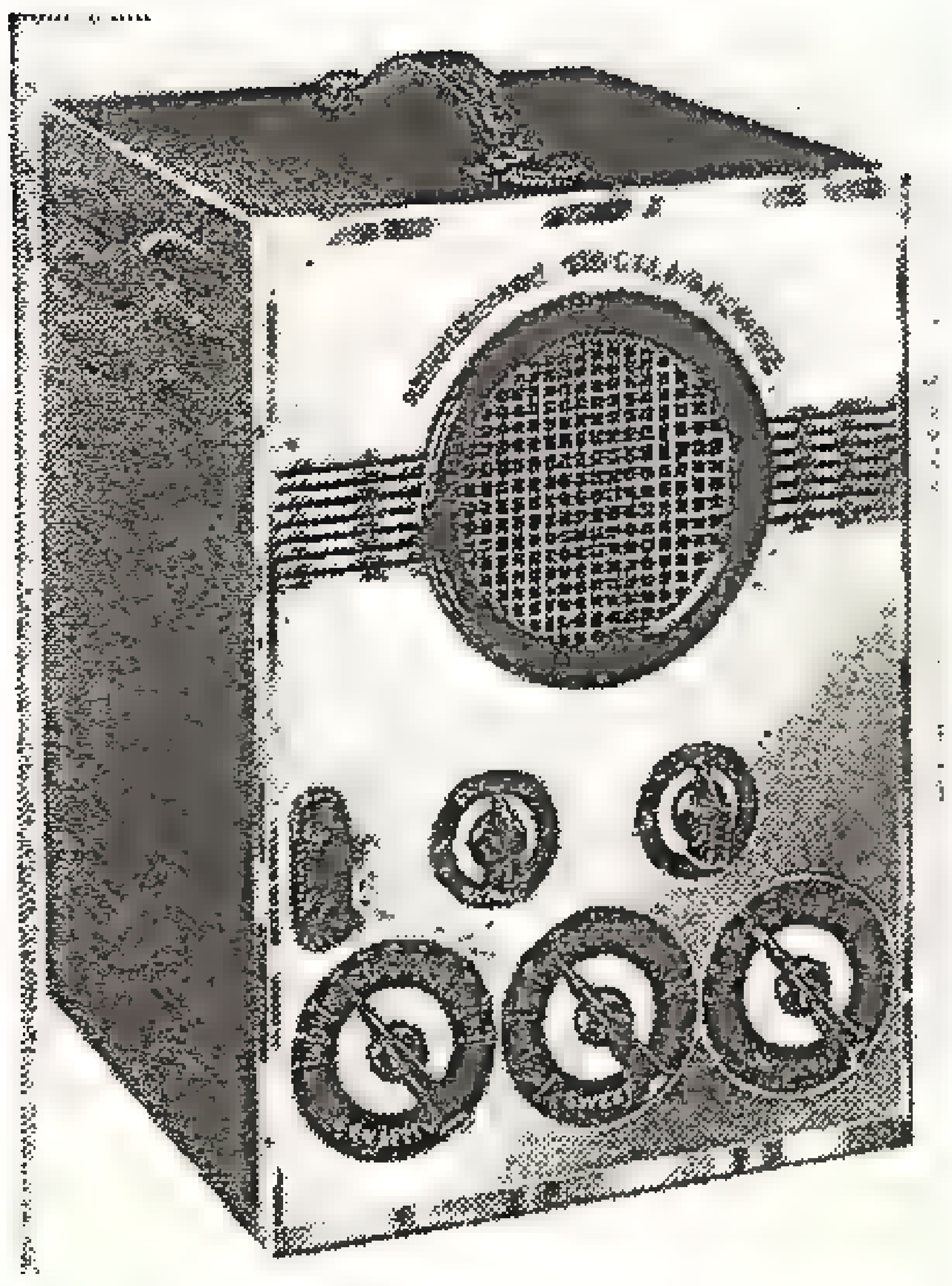
This machine will dice, slice, or shred any vegetable or fruit in one operation of the foot petal. A punch is set at the top and a die at the bottom. Each operation requires a die.

A universal welding generator that welds all thicknesses of plate from one-sixteenth to six inches and metals such as steel, copper and aluminum.

A new type window lock that has a bolt and latch combination that can be safely locked with a special key.

A kerosene stove designed for keeping auto engines warm in cold weather that operates at a cost of about two cents per day.



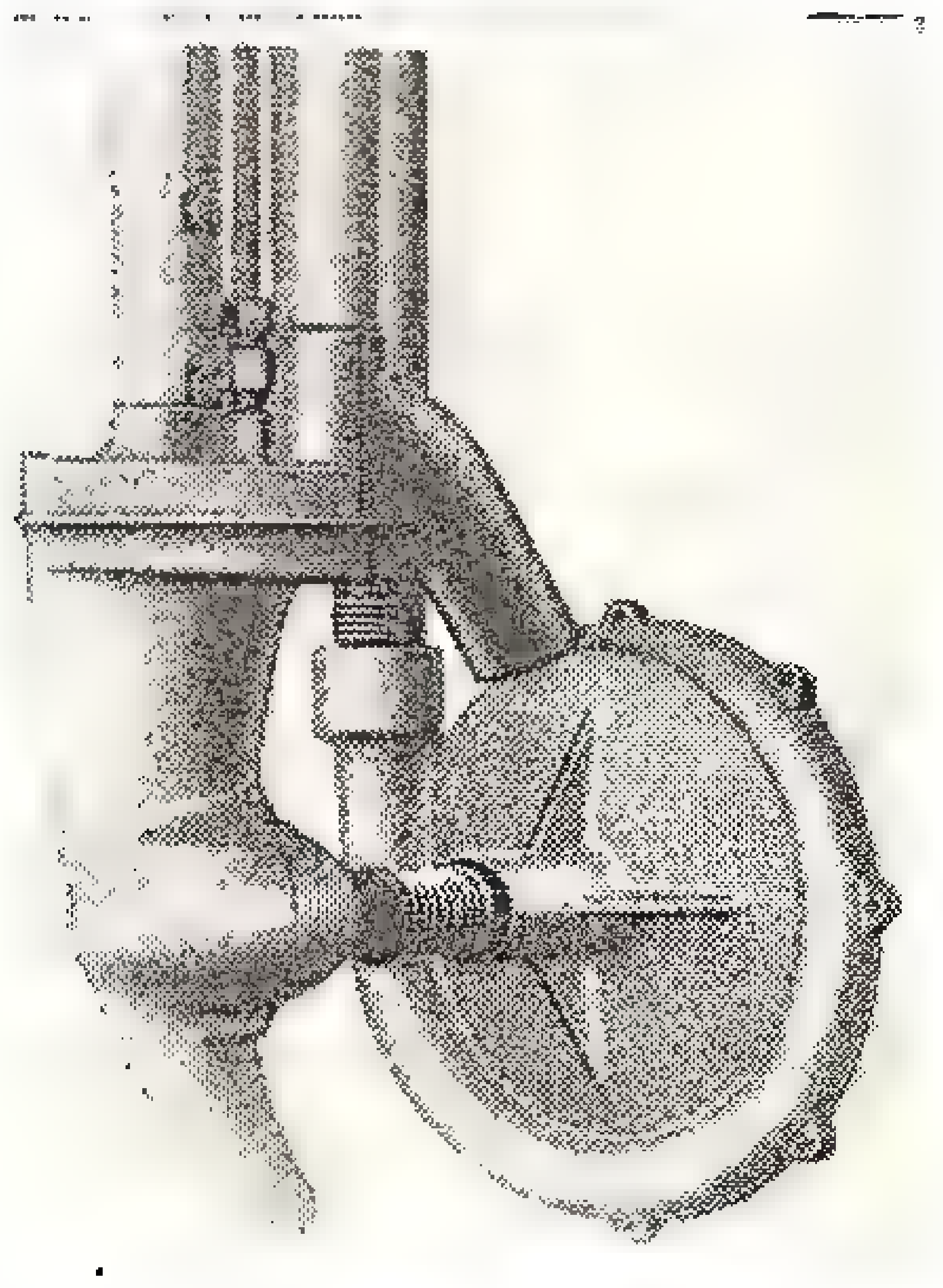
This oscilloscope enables music students to see as well as hear music sounds. Sound wave pattern is traced on a small screen.

A specially designed vacuum cleaner for automobile use in which the dirt is collected in an easily emptied metal container. Operates on AC or DC current. Small in size, it is conveniently carried.

A coffee roaster that enables the product to be freshly roasted at the point of sale.

Hexagonal packages designed for convenience in storage.

A portable dance "floorette," a folding miniature floor that can be laid on top of rugs.



Attached in three minutes, this device converts an outboard marine motor into an efficient water pump suitable for use at home or camp.

A machine safety guard that gives double protection to the operator because it has both a stationary and a sweep guard.

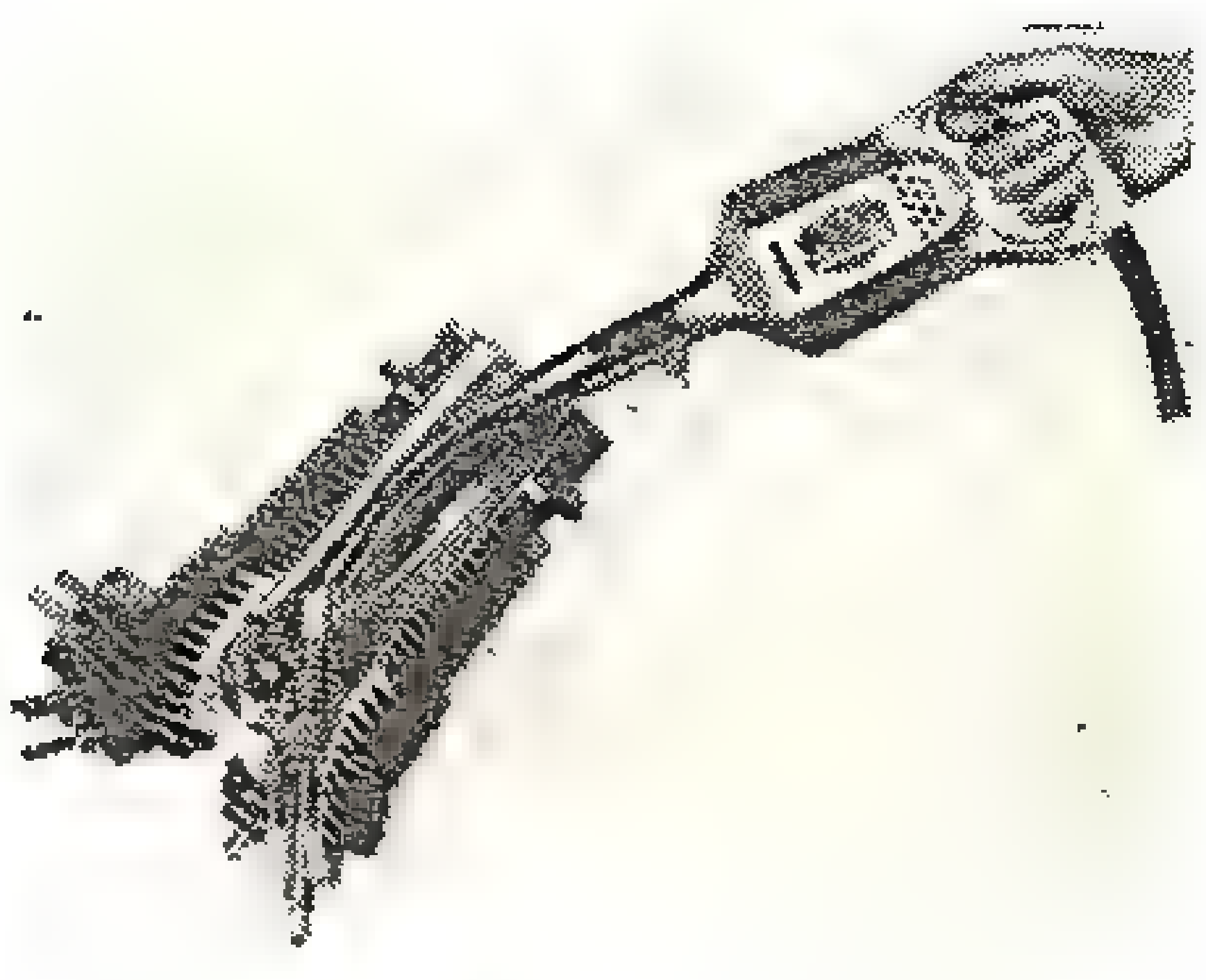
A new soap pulverizer for lavatory use which, at the twist of a crank, converts a cake of fine, milled soap into a pulverized form and feeds it to the hands of the user.

An automatic welding torch lighter that operates on 110 volts or less and which lights the torch when a magic button is touched with the torch tip.

An x-ray projecting machine that enables a dentist's patient to view his teeth defects on an enlarged scale upon a screen.

A new mechanical color analyzer that reduces all hues to plain black and white of different densities and translates color shades into curves plotted on graph paper.

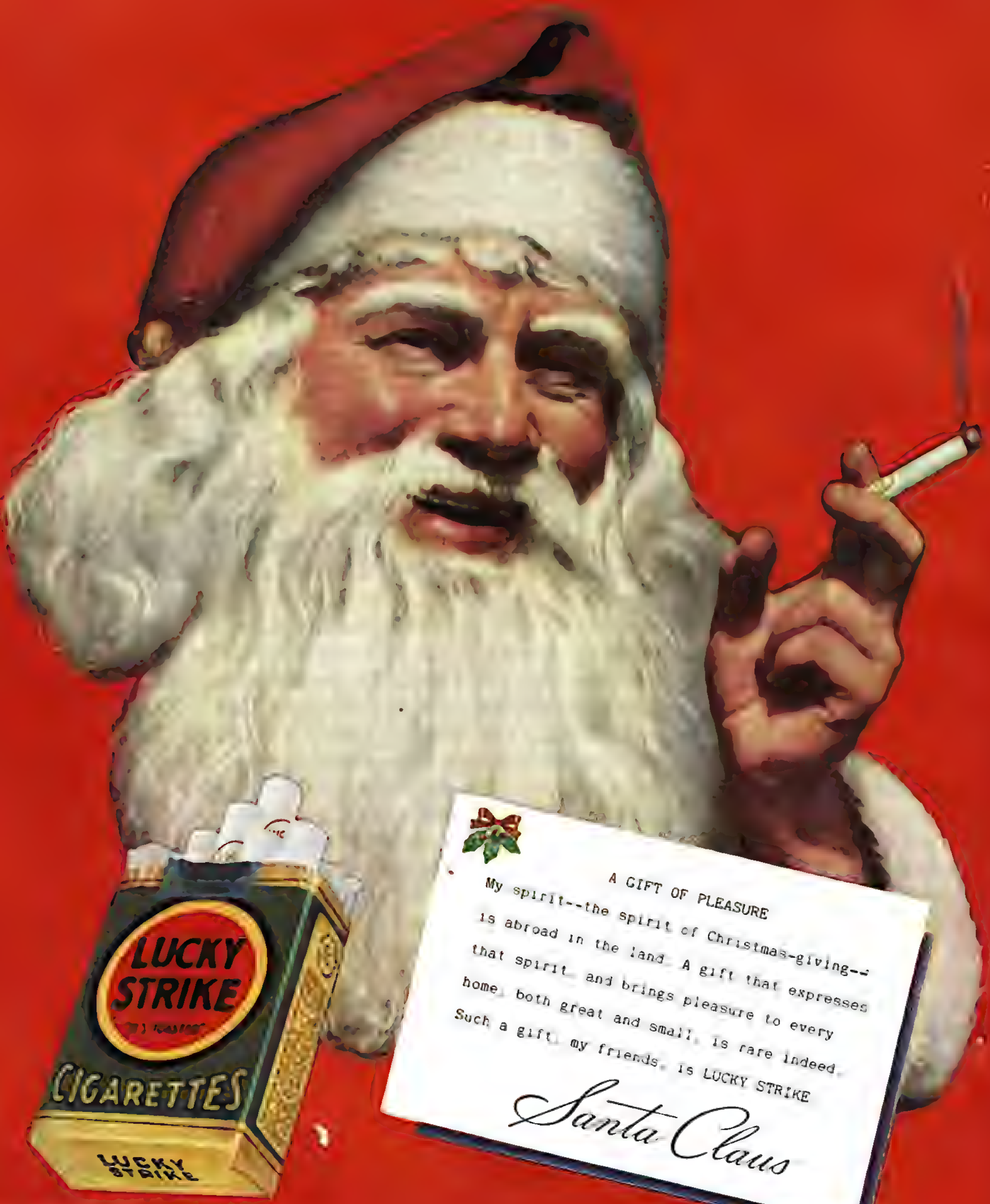
A new electric light bulb has a special glass that filters out rays harmful to eye nerves.



The vibrating spindle of this valve seat grinder lifts the stone from the seat each revolution, throwing off waste particles in revolving.

Editor's Note—Addresses of manufacturers of these and other new products in this issue can be obtained by sending a stamped, self-addressed envelope to Modern Mechanix Publishing Co., Information Bureau, Fawcett Building, Greenwich, Connecticut. Manufacturers are invited to submit material for publication on this page.

Inside Back Cover missing


LUCKY STRIKE
"IT'S TOASTED"
CIGARETTES
LUCKY STRIKE

A GIFT OF PLEASURE

My spirit--the spirit of Christmas-giving--is abroad in the land. A gift that expresses that spirit, and brings pleasure to every home, both great and small, is rare indeed. Such a gift, my friends, is LUCKY STRIKE

Santa Claus

Luckies–a light smoke

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J. E. SMITH, Pres., Natl. Radio Institute
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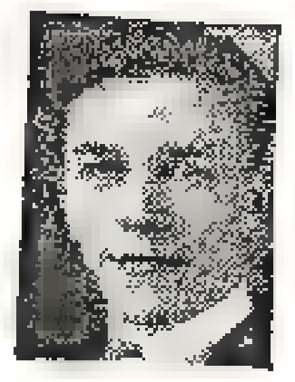
MANY MAKE $30 $50 $75 A WEEK

I Will Train You at Home—mail coupon for FREE Book

HERE'S PROOF THAT MY TRAINING PAYS

Chief Operator Broadcasting Station

"When I completed 20 lessons, I obtained my Radio Broadcast Operator's license and immediately joined Station WMPC, where I am now Chief Operator."—HOLLIS F. HAYES, 85 Madison St., Lapeer, Mich.



$10 Week in Spare Time

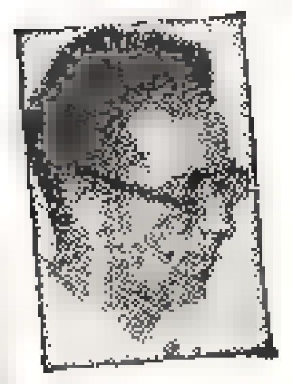
"My work has consisted of Radio set servicing, with some Public Address Systems work—all in my spare time. My earnings in Radio amount to about $10 a week."—WILLIAM MEYER, 705 Ridge Road, Hobart, Ind.

Service Manager For Four Stores

"I was working in a garage when I enrolled with N. R. I. In a few months I made enough to pay for the course three or four times. I am now Radio service manager for the M—— Furniture Co., for their four stores."—JAMES E. RYAN, 1535 Slade St., Fall River, Mass.

Own Business Pays $300 a Month

"I now have my own Radio business which shows three hundred dollars a month profit—thanks again to National Radio."—FRANK T. REESE, 39 N. Felton St., Philadelphia, Penna.



Earned $50 First Month in Spare Time

"I knew nothing about Radio. After four lessons I began servicing Radios, earning $50 the first month. Last winter I made as high as $100 a month in spare time."—G. F. WALTON, 808 West Olney Road, Norfolk, Va.

Do you want to make more money? Radio offers you many opportunities for well-paying spare time and full time jobs. And you don't have to give up your present job or leave home and spend a lot of money to become a Radio Expert.

Many Radio Experts Make $30, $50, $75 a Week

Radio broadcasting stations employ engineers, operators, station managers and pay up to $5,000 a year. Spare time Radio set servicing pays as much as $200 to $500 a year—full time jobs with Radio jobbers, manufacturers and dealers as much as $30, $50, $75 a week. Many Radio Experts operate their own full time or part time Radio sales and service businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, paying up to $6,000 a year. Radio operators on ships get good pay and see the world besides. Automobile, police, aviation, commercial Radio, and loud speaker systems are newer fields offering good opportunities now and for the future. Television promises to open many good jobs soon. Men I have trained are holding good jobs in these branches of Radio. Read their statements. Mail the coupon.

There's a Real Future in Radio for Well-Trained Men

Radio already gives jobs to more than 300,000 people. In 1935 over $300,000,000 worth of sets, tubes and parts were sold—an increase of 20% over 1934! Over 1,100,000 auto Radios were sold in 1935, 25% more than in 1934! 22,000,000 homes are today equipped with Radios, and every year millions of these sets go out of date and are replaced with newer models. Millions more need servicing, new tubes, repairs, etc. Broadcasting stations pay their employees (exclusive of artists) more than $23,000,000 a year! And Radio is a new industry, still growing fast! A few hundred $30, $50, $75-a-week jobs have grown to thousands in less than 20 years!

Many Make $5, $10, $15 a Week Extra in Spare Time While Learning

Practically every neighborhood needs a good spare time serviceman. The day you enroll I start sending you Extra Money Job Sheets. They show you how to do Radio repair jobs that you can cash in on quickly! Throughout your training I send you plans that made good spare time money—$200 to $500 a year—for hundreds of fellows. My training is famous as "the Course that pays for itself."

THE TESTED WAY TO BETTER PAY

I Give You Practical Experience

My Course is not all book training. I send you special Radio equipment and show you how to conduct experiments and build circuits which illustrate important principles used in modern Radio receivers, broadcast stations and loud speaker installations. I show you how to build testing apparatus for use in spare time work from this equipment. This 50-50 method of training makes learning at home interesting, fascinating, practical.

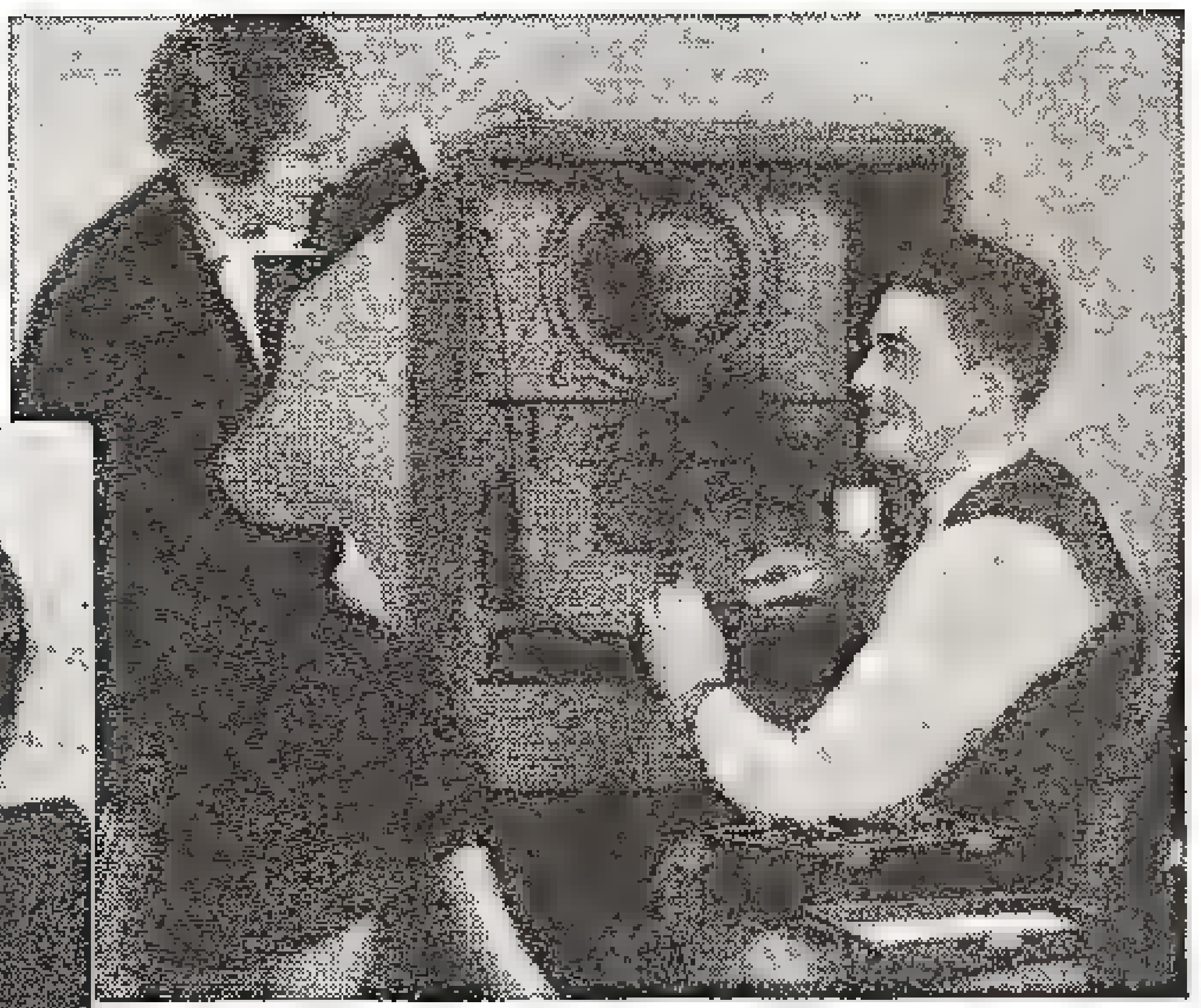
You Get a Money-Back Agreement

I am so sure that I can train you successfully that I agree in writing to refund every penny you pay me if you are not satisfied with my Lessons and Instruction Service when you finish. I'll send you a copy of this agreement with my **Free Book.**

Find Out What Radio Offers You

Act Today. Mail the coupon now for "Rich Rewards in Radio." It's free to any fellow over 16 years old. It describes Radio's spare time and full time opportunities and those coming in Television; tells about my training in Radio and Television; shows you actual letters from men I have trained, telling what they are doing and earning. Find out what Radio offers YOU! MAIL THE COUPON in an envelope, or paste on a postcard—NOW!

J. E. SMITH, Pres.,
National Radio Institute, Dept. 7AH
Washington, D. C.



Set Servicing

Spare time set servicing pays many $5, $10, $15 a week extra while learning. Full time servicing pays as much as $30, $50, $75 a week.

Broadcasting Stations

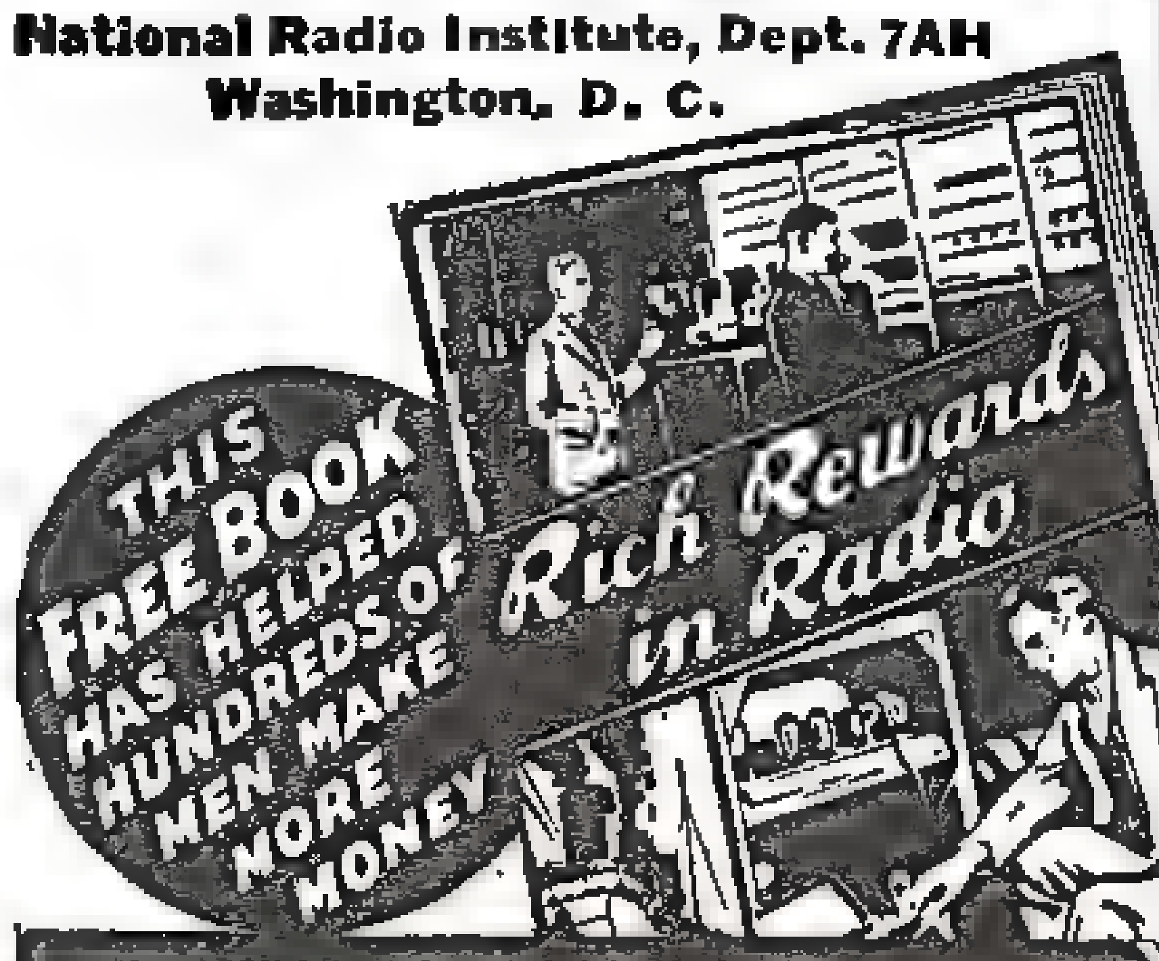
Employ managers, engineers, operators, installation and maintenance men for fascinating jobs and pay up to $5,000 a year.

Loud Speaker Systems

Building, installing, servicing and operating public address systems is another growing field for men well trained in Radio.

Automobile Radio

Another new Radio field—selling, installing, servicing. One million or more auto owners will install radio sets within the next year.



THIS FREE BOOK HAS HELPED HUNDREDS OF MEN MAKE MORE MONEY
Rich Rewards in Radio

Mail this to get 64 page Book FREE

Mr. J. E. SMITH, President, Dept. 7AH
National Radio Institute, Washington, D. C.

Dear Mr. Smith: Without obligating me, send "Rich Rewards in Radio," which points out the spare time and full time opportunities in Radio and explains your 50-50 method of training men at home in spare time to become Radio Experts. (Please Write Plainly.)

NAME .... AGE ....

ADDRESS ....

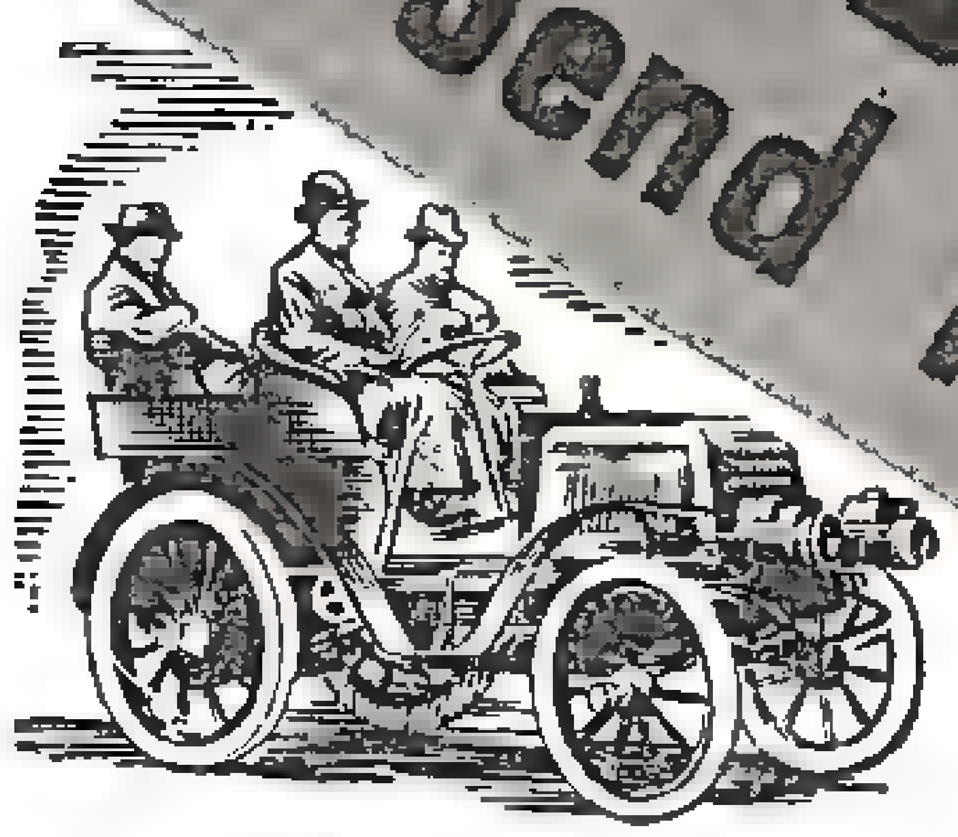
CITY .... STATE ....

INVENTORS

Send for Valuable Facts *about*

David Sarnoff says:

DAVID SARNOFF, once a poor lad and now the famous President of the Radio Corporation of America, in an article in Liberty Magazine states: "Civilization means elimination of unnecessary labor. The sewing machine and the vacuum cleaner save millions of women from backbreaking toil. The tractor makes the farmer's life bearable. The automobile lends wings to us all. The airplane is our magic carpet. It would be madness to slow up invention because our trouble is not that mechanical science moves too speedily, but that the governmental and social sciences move too slowly . . . In a world reorganized to vibrate within certain wave bands, human intelligence will be able to distribute equitably nature's bounties from above and below, and make princes of paupers."



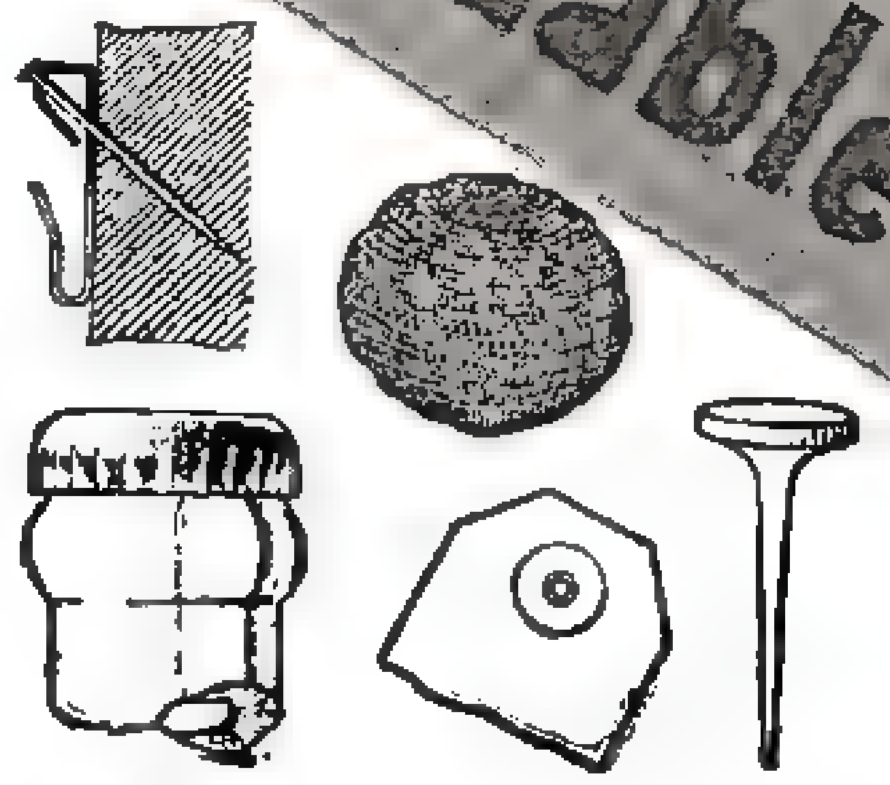
Since the "Horseless Buggy" Days, We Have Helped Inventors

PERHAPS you have already heard about our firm, because one client tells another—and we have served men in every state in the Union, and in nearly every foreign country. We have been working with inventors since 1898. If you have a good invention—or an idea for one—and don't know what Victor J. Evans & Co. can do for you, NOW is the time to find out.

How We Can Help You

Both the Patent Office and the U. S. Supreme Court have made it clear that the inventor needs the assistance of a competent patent lawyer when it comes to protecting an invention. It is one thing to think up a good invention—it is another to get effective patent protection on it.

For more than a third of a century—it has been our business to give sound advice and counsel to inventors. Our free books (described on the opposite page) tell what steps to take first, how to protect yourself, how the laws protect you, what you must do, when to offer your invention for sale, how others have succeeded, and much more. You need this information.



Simple Inventions May Have Excellent Commercial Possibilities

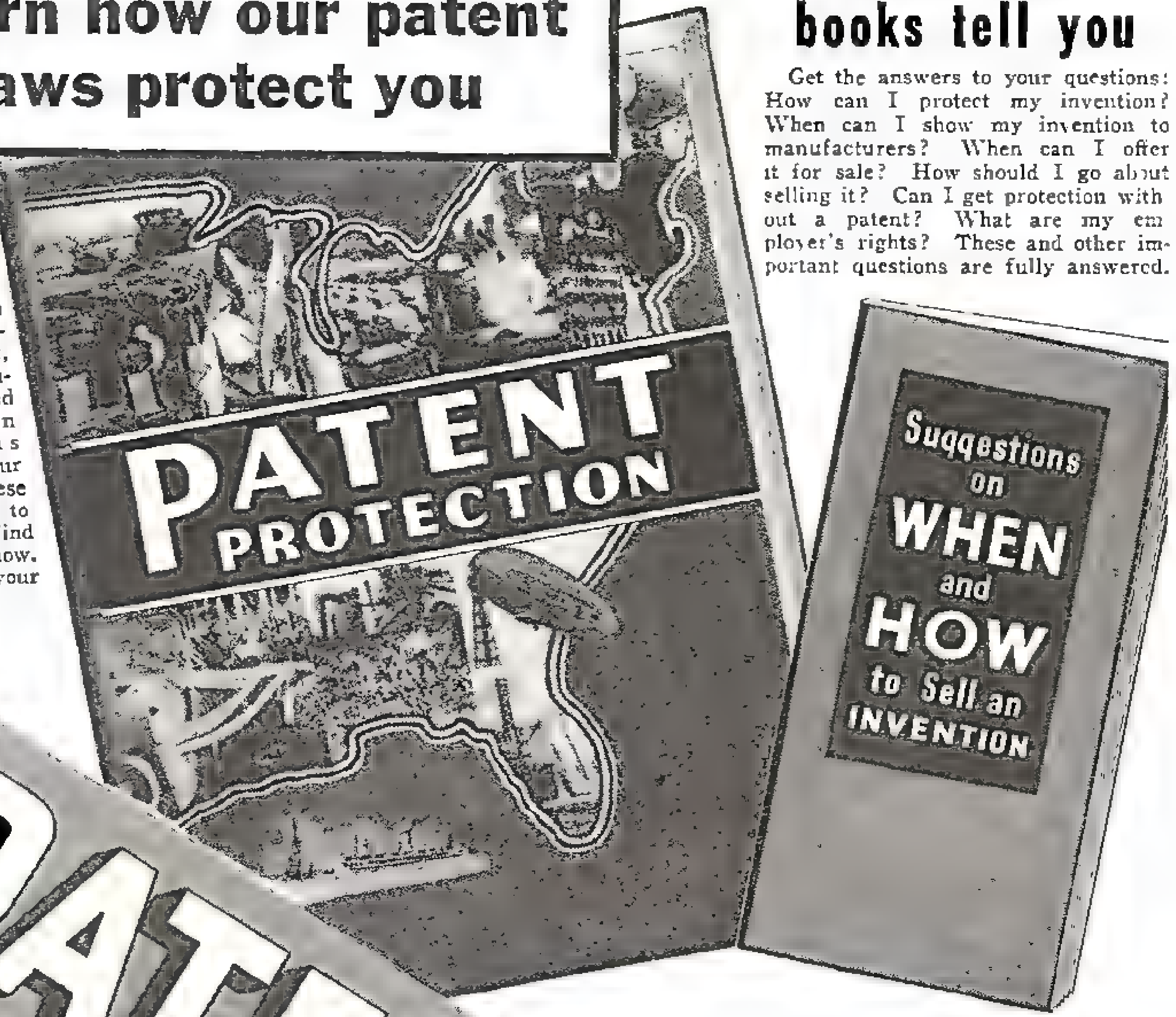
FREQUENTLY inventors confuse the size or the complication of a device with the question of commercial value and patentability. These two factors, of course, have no relation to each other. Most of our present day complicated machines represent a process of evolution, a series of inventions. On the other hand, every so often some inventor comes along with a very simple "gadget" which possesses the elements of broad utility and is patentable. Some of the most profitable inventions have been of this latter class. Shown above are a few such examples. Whether a device is simple or complex, if it represents a forward step to save manufacturing costs, to save labor, or to add enjoyment to human life, it may prove patentable and profitable. This subject is more fully discussed in the booklet entitled "Patent Protection" shown on the opposite page.

What Will Be Next?

EVER since George Washington signed the first patent, America has led the world in inventions. It may be said that not a year has gone by without some important inventions being patented and commercialized. David Sarnoff, president of the Radio Corporation of America, sees a big future ahead for science and invention. Just as sure as the sunrise, 1937 will see new inventions come out—new wealth made from patents. Your idea may be one of them. You never can tell. For this reason you should send for our books today and get the facts about patents and inventions.

Learn how our patent laws protect you

The U. S. has liberal patent laws, and much of our national wealth is based on patents. In fact, a Japanese commission decided that American progress was mainly due to our patent laws. These laws are made to protect you. Find out about them now. This is for your own good.

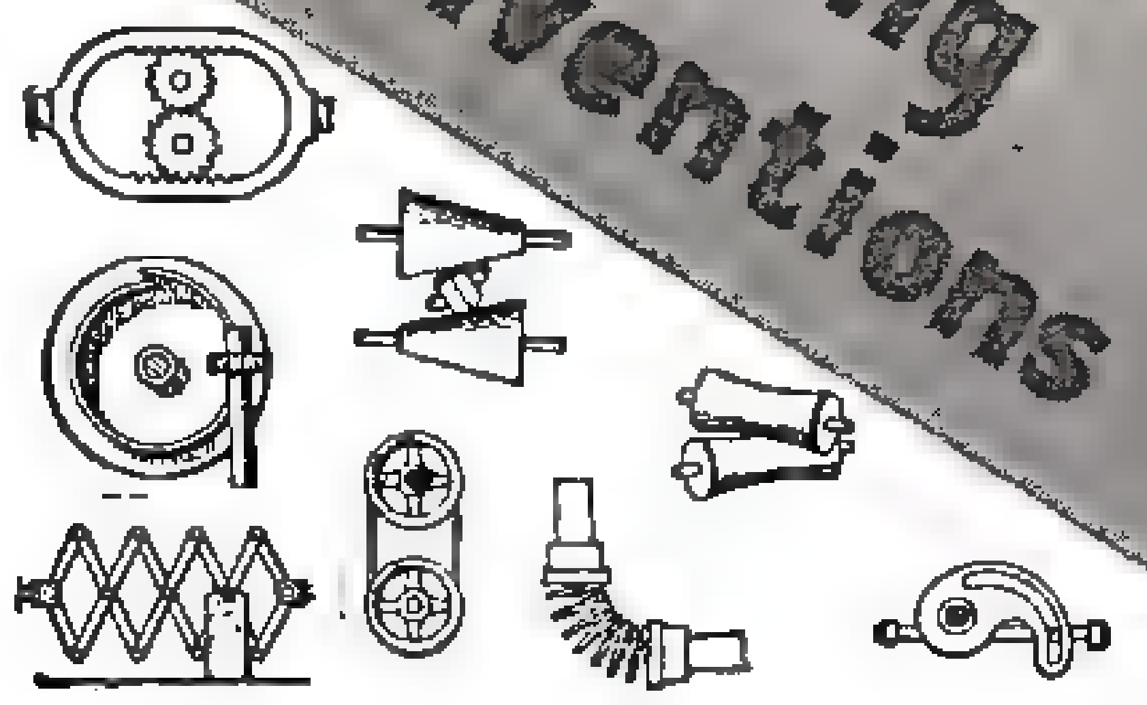

PATENT PROTECTION
Suggestions on WHEN and HOW to Sell an INVENTION

These FREE books tell you

Get the answers to your questions: How can I protect my invention? When can I show my invention to manufacturers? When can I offer it for sale? How should I go about selling it? Can I get protection without a patent? What are my employer's rights? These and other important questions are fully answered.

PATENTS

and Selling Inventions



115 Mechanical Principles Shown

Request the book "Patent Protection" (sent free to inventors). Not only does it tell you what to do for protection, and how to do it—it also shows you 115 different mechanical movements that you may use in developing your own inventions. Inventors tell us they have found these useful.

Mail Coupon Today

Delays are dangerous. If you have a good invention you should get protection for it just as soon as possible. Don't turn this page until you have clipped and mailed this coupon—you will hear from us by return mail.

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Send me FREE copies of your books, "Patent Protection" and "When and How to Sell an Invention." (Note: Same books supplied by any of branch offices listed above.)

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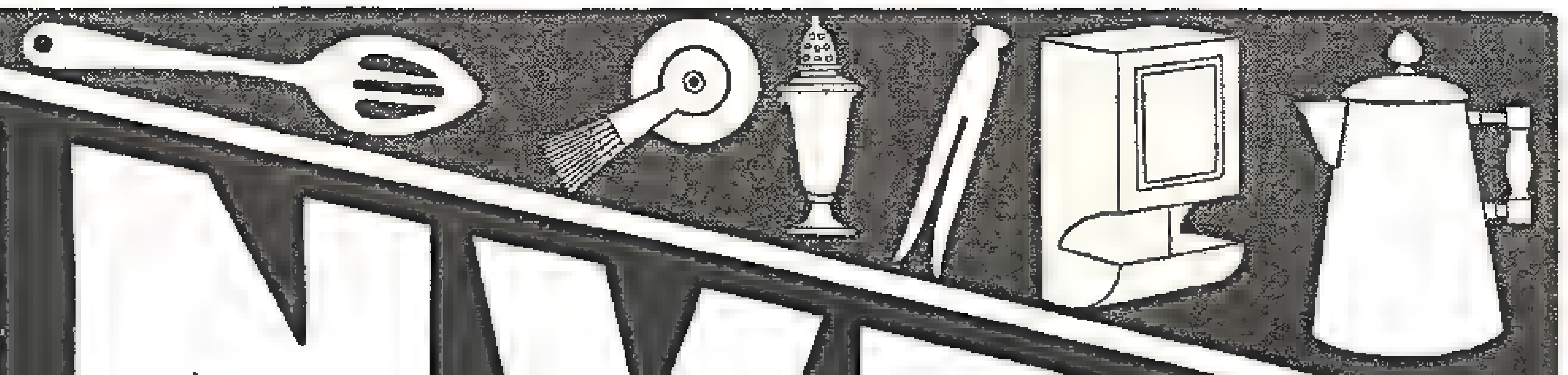
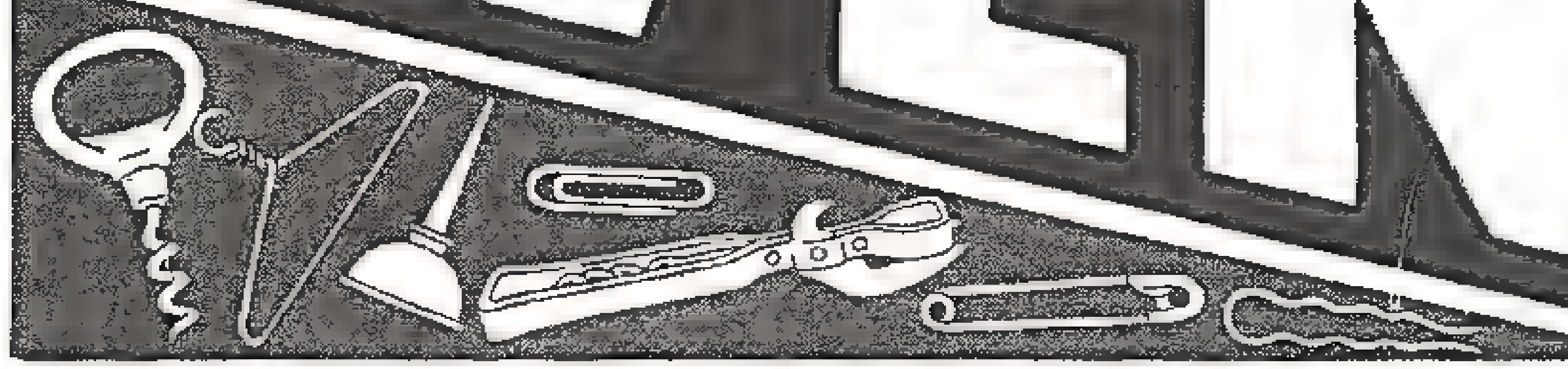
INVENTORS





Small Inventions THAT HAVE BUILT BIG BUSINESSES

INVENTIONS do not have to be complicated to be profitable when Patented. The 5c and 10c stores flourish on simple Patented products which are commercially successful. The zipper, safety pin, thumb tack, paper clip, collar button—all simple, yet familiar inventions—brought their inventors rich rewards. If you have a Patentable invention—act to protect it. Many of the most useful, widely popular, greatly profitable, and extremely successful inventions have been very simple ones. You have only to look at the devices we have pictured here to realize how a simple invention may become a utility bought by a hundred thousand or a million people soon after it is produced. Don't be afraid that the simplicity of your invention makes it valueless. The thing that you find so simple that you wonder why a thousand other people haven't already done it is often the invention worthwhile.

HOW OTHER INVENTORS GOT STARTED

INVENTOR AND BUSINESS MAN
George Eastman

The list of men who succeeded in invention with only a poor boy's start is a very long and noble one. Poverty, hardships, lack of friends, distance from the market—these could not hold back Bell, Edison, Eastman, McCormick, Whitney and others. Everyone cannot succeed. But every man can try. Courage, sacrifice, and hard work may bring you a measure of the success these men had. Lack of mechanical ability is not a serious draw-back. You can always get someone able to build a model, draw a detailed design, or otherwise materialize your invention for you. The big draw-back is discouragement.

Your invention of a practical article or an improvement upon an old one should be patented NOW. Frequently many of the thousands of applications filed in the U. S. Patent Office each year are for the same or almost the same invention. In such a case, the burden of proof rests with the last application filed. Sometimes a delay of even a few days in filing the application means the total loss of the patent. LOSE NO TIME.

The entire time of this large and experienced organization is devoted exclusively to patent and trade-mark cases. We know the rules and requirements of the Patent Office. We understand the technicalities of Patent Law. We can proceed in the quickest and safest ways in preparing an application for a patent covering your invention.

FREE THE BIOGRAPHY OF GEORGE EASTMAN

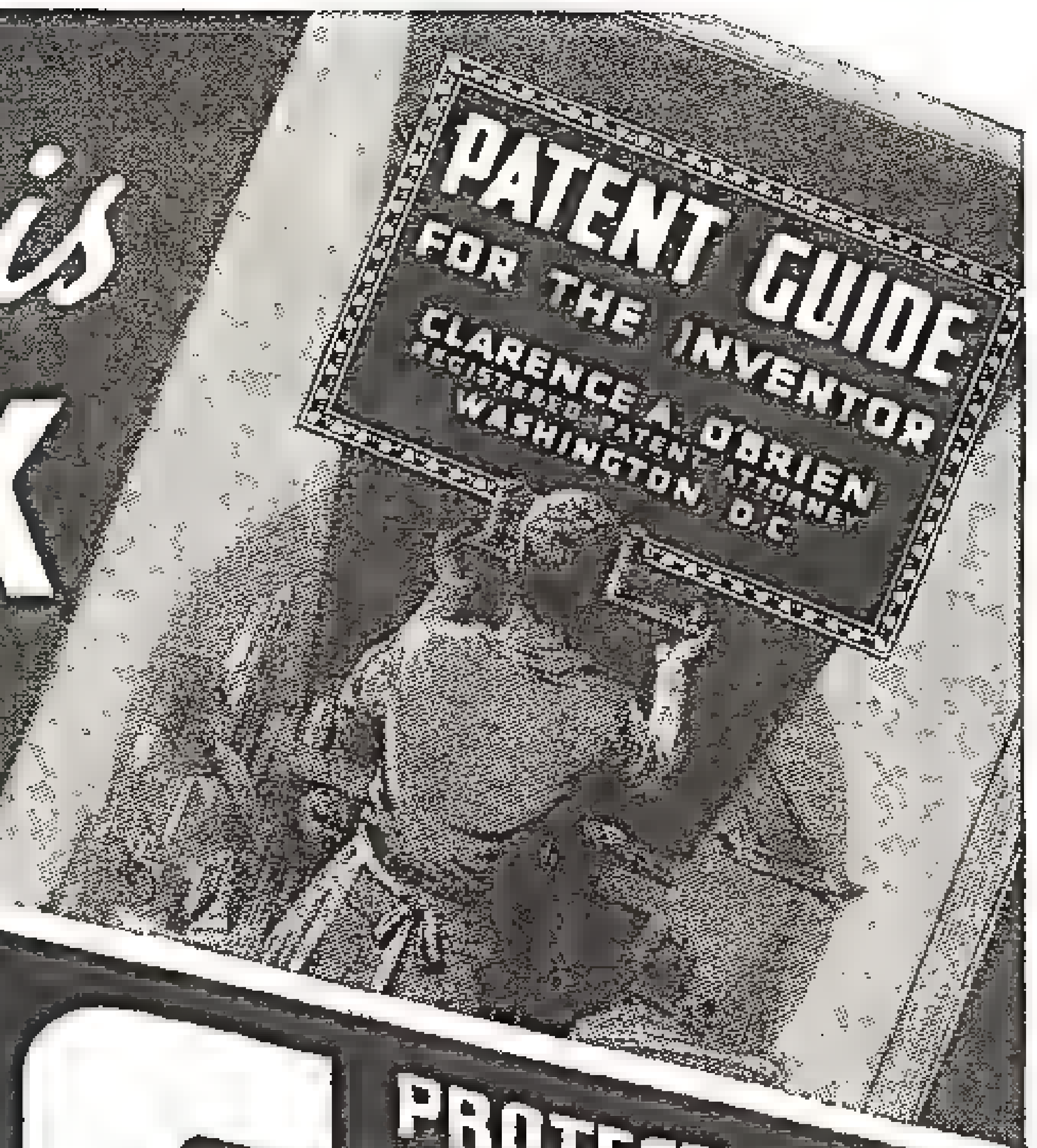
Views of the man who used Patent Protection to amass millions and give perfection to a new art—*Photography*—itself one of the greatest inventions.

CLARENCE A. O'BRIEN & HYMAN BERMAN

317-S ADAMS BUILDING **WASHINGTON, D. C.**

Registered Patent Attorneys Before U. S. Patent Office

Send For This FREE BOOK



PROTECT YOUR INVENTIONS WITH U.S. PATENTS

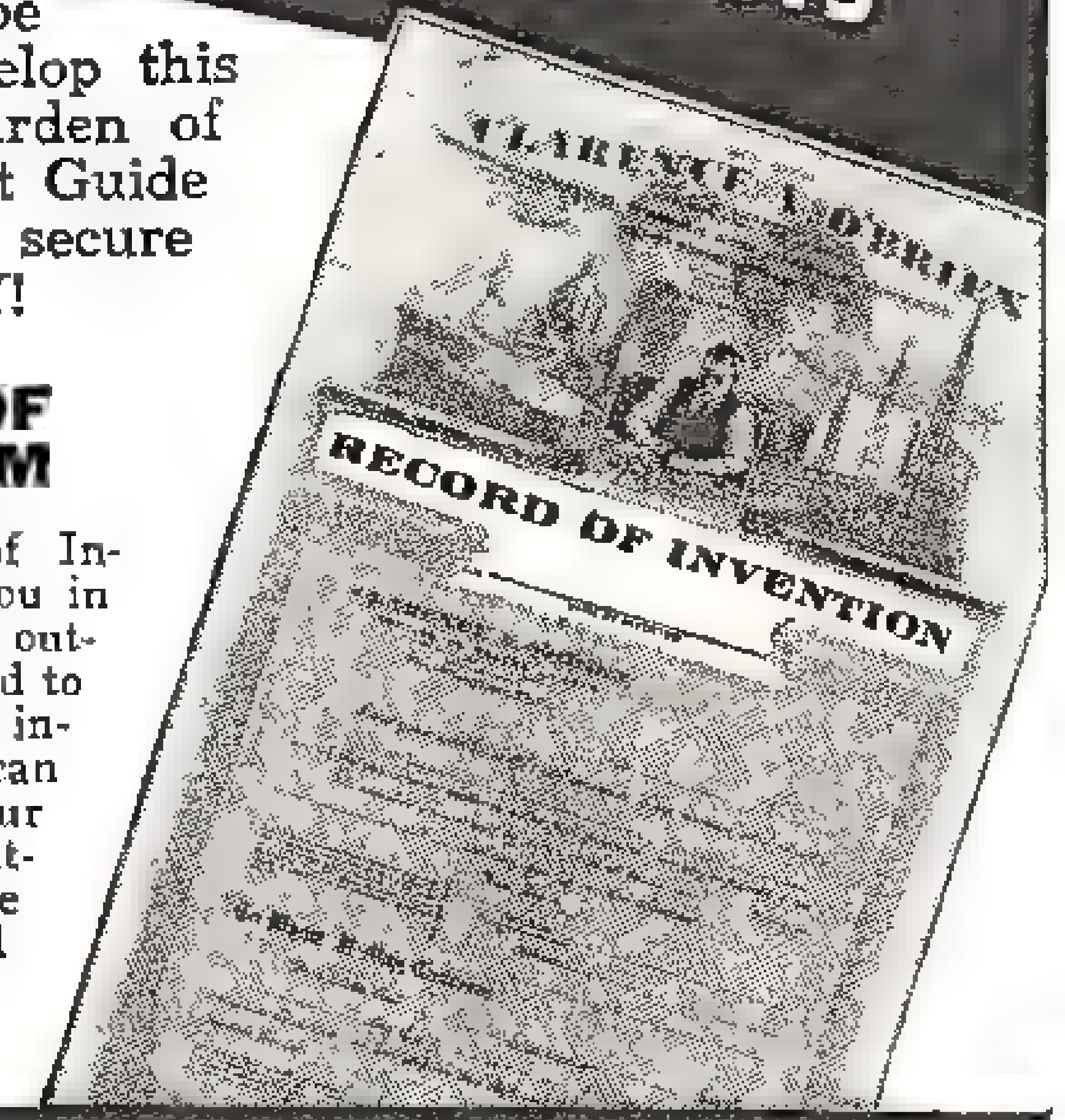
If you have an invention that is patentable—and want to secure for yourself your inventor's sole right to profit from the invention—you can't afford to lose time in securing the protection of a U. S. Patent. Other inventors may be working on the same invention right now. Should they develop this invention and file patent application before you do—the burden of establishing priority will be upon you. Our Big Book—"Patent Guide for the Inventor"—will tell you the quickest possible way to secure Patent Protection for your invention. SEND FOR IT TODAY!

The First Important Step in Securing a Patent

is to obtain the services of a Registered Patent Attorney. The U. S. Patent Office advises that you secure the aid of an experienced Registered Patent Attorney to prepare your statements. Establish the date of your invention as explained in our book and disclose your invention to him in correct form. He then makes a SEARCH of the Patent Office Records and reports to you on existing U. S. Patents which might bear on your invention, giving his opinion on the advisability of proceeding and filing formal application.

Reasonable Fees—Convenient Terms

Don't worry about finances. Our fees are very reasonable—we can arrange convenient terms of payment. It is our custom to permit clients to pay for our services in installments as the application progresses in our office. See our Big Book for fees in obtaining Patent. It explains our arrangements clearly. Send for it NOW!



FREE RECORD OF INVENTION FORM

Use our Free "Record of Invention" form to assist you in recording the descriptive outline of your inventions and to establish the date of your invention. With it you can make a rough sketch of your invention and have it witnessed in a manner of value to you as evidence should occasion arise.

CLARENCE A. O'BRIEN
& HYMAN BERMAN
317-S ADAMS BUILDING
WASHINGTON, D.C.
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BEFORE U.S. PATENT OFFICE

Please send me at once your Big Free 48-Page Book, "Patent Guide for the Inventor" and your Specially Prepared "Record of Invention" form. Also George Eastman Biography, "Inventor and Business Man." This request does not obligate me.

NAME ....

ADDRESS ....

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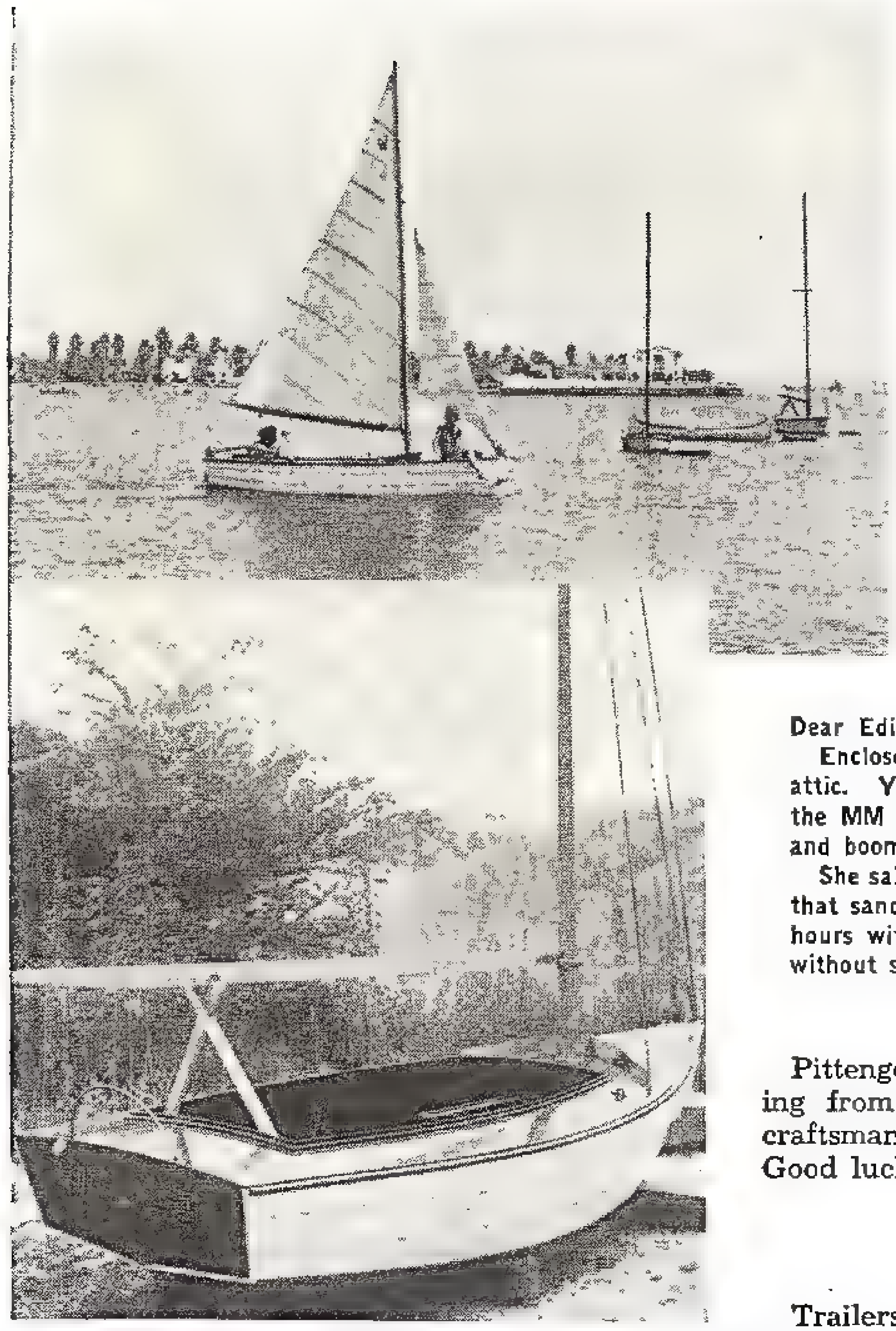
(*Please write or print plainly*)

Random Chips from the Editor's Workbench



Top—A. D. Pittenger, of Los Angeles, Calif., takes a friend for a sail in NOMAD, a boat built from MM plans. It carries four people. Bottom—Close-up showing construction.

THE mailbag was pretty heavy this month and letters and photos describing many interesting projects completed by MM readers indicate that home workshops are gaining in popularity. From workshops with limited space and a few good tools to spacious shops equipped with lathes, many tools, and other mechanical aids, MM readers are turning out projects of every type and description. Most of them are built from plans that appeared in past issues of MM publications.

***

Talking about making things, don't overlook the new 1937 edition of the MM Handy Man's Home Manual that is now on sale at your local newsstand at 50 cents per copy. If your newsdealer has run out of copies, order one direct from MM at Greenwich, Conn.

Presenting many practical kinks, plans, and detailed instructions for many projects, the manual will be a welcome addition to the library of any workshop fan. Its 144 pages feature over 800 illustrations.

***

First prize of $5 cash for the most interesting project photo received this month goes to A. D. Pittenger, of Los Angeles, Calif. He says:

Los Angeles, Calif.

Dear Editor:

Enclosed are photos of NOMAD which I built in my attic. You can see from the photos that I followed the MM plans very closely, even to the hollow mast and boom, although I changed the cockpit a bit.

She sails nicely and I have had her in a blow so hard that sand was flying on the beach. I have sailed for hours with four aboard and have hit some big waves without shipping any water.

A. D. Pittenger.

Pittenger's boat certainly is a beauty and judging from the close-up of the craft, it entails craftsmanship of which he may well be proud. Good luck, Pittenger.

***

Trailers are becoming more numerous and MM readers are quick to show their skill at constructing them as the following letter proves:

A real home on wheels is this trailer built by Howard R. Goldy, of Camden, N. J. Its four bunks, stove, radio, sink, and other household articles insure comfortable traveling.

Camden, N. J.

Dear Editor:

I am sending you a photo of my trailer. It is 12 feet long and has a chassis similar to the one used by Sir Guy Standing in the MM "How To Build It" book.

Inside the trailer are four bunks, stove, refrigerator, closet, sink, and a home-built five tube radio. I have the MM article describing the CRUISEMITE trailer and would like to make my next trailer like it.

Howard R. Goldy.

Mr. Goldy was awarded a prize of $3 for his trailer photo and letter. He certainly has turned out a creditable trailer and we know he will encounter no trouble in building CRUISEMITE.

***

Midget cars are still a heavy favorite with MM craftsmen and hardly a mail fails to bring several photos of trim little speedsters. A $3 prize was sent to Homer Groce, of Clemson, S. C., who says:

Clemson, S. C.

Dear Editor:

I am enclosing a photo of a car I built. It has a model A Ford motor hooked up to a model T Ford rear-end.

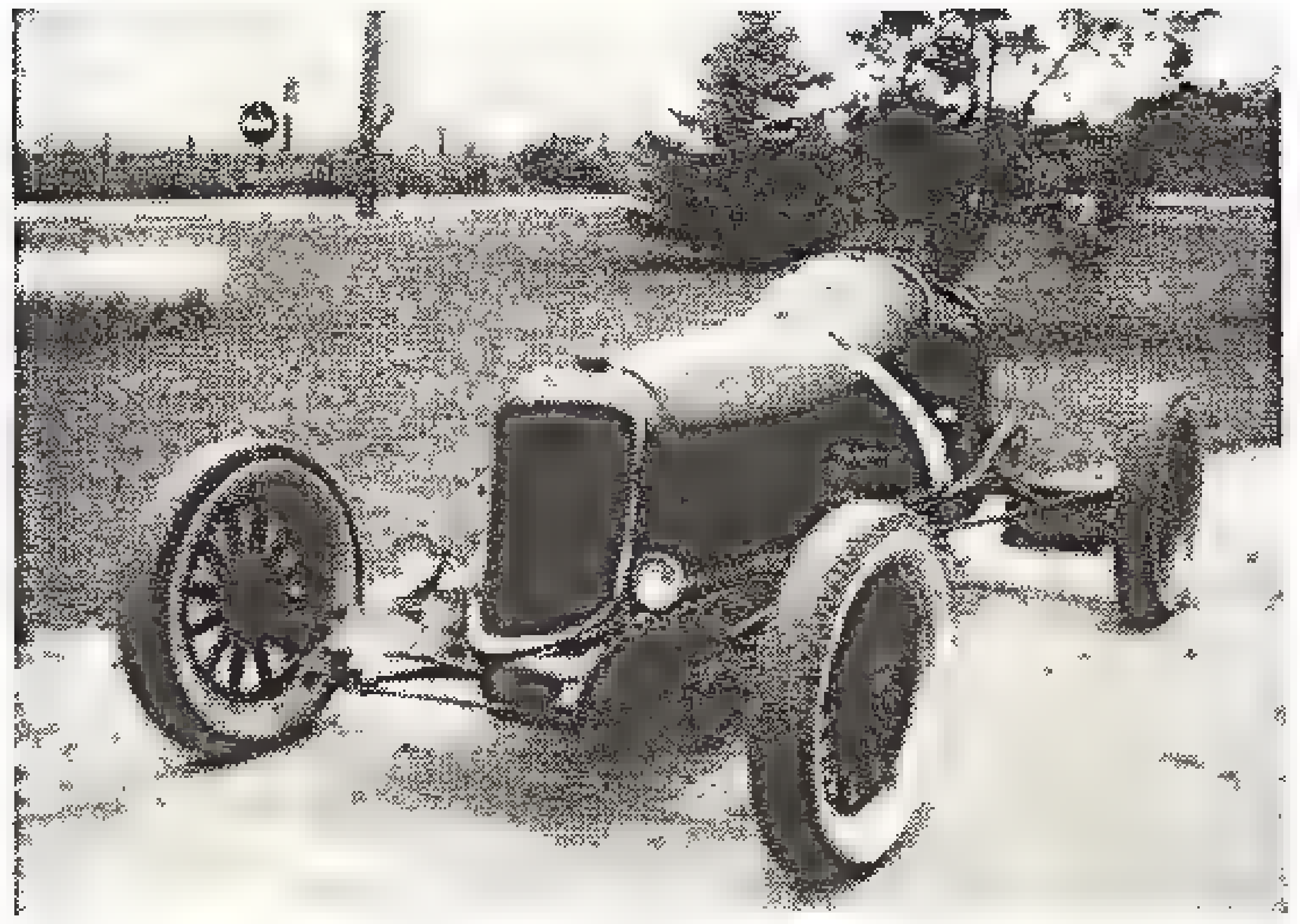
Cooling is accomplished by two radiators, cut down, and placed one in front of the other. I get 28 miles per gallon with the car and it is capable of doing 80 m.p.h. I will gladly answer any questions from MM readers if they include a stamped, return envelope with their inquiries.

Homer Groce.

Here's a chance to get first hand information about a real snappy looking racer. You can reach Mr. Groce at Clemson College, Clemson, S. C.

***

Boats and more boats. All good ones, too. No matter how many workshop letters the editor receives, the number of boat letters and photos far outnumbers the others. Our only regret is that we cannot print more of the letters, but space is limited.



Featuring a double radiator cooling system, this midget racer attains a speed of 80 m.p.h. and travels 28 miles on a gallon of gasoline. It was built by Homer Groce, of Clemson, S. C.

A pleasant sight to the eyes of boat lovers is this trim looking sailboat built from MM plans. BUDDY, as the boat is known, was built in little over a year by Neil Hoyt, of Detroit, Mich.

From Detroit, Mich., comes a letter and photo that secured a $3 prize for its writer.

Detroit, Mich.

Dear Editor:

Here is a picture of BUDDY, built from plans in the MM book—"How To Build 20 Boats." I am very proud of her as she is the first boat I ever built. It cost about $250 and required a year and three months to build.

I am putting outside ballast on the keel this winter as I use her on the Great Lakes. I'll be glad to give any information to MM readers who may wish to build BUDDY.

Neil Hoyt.

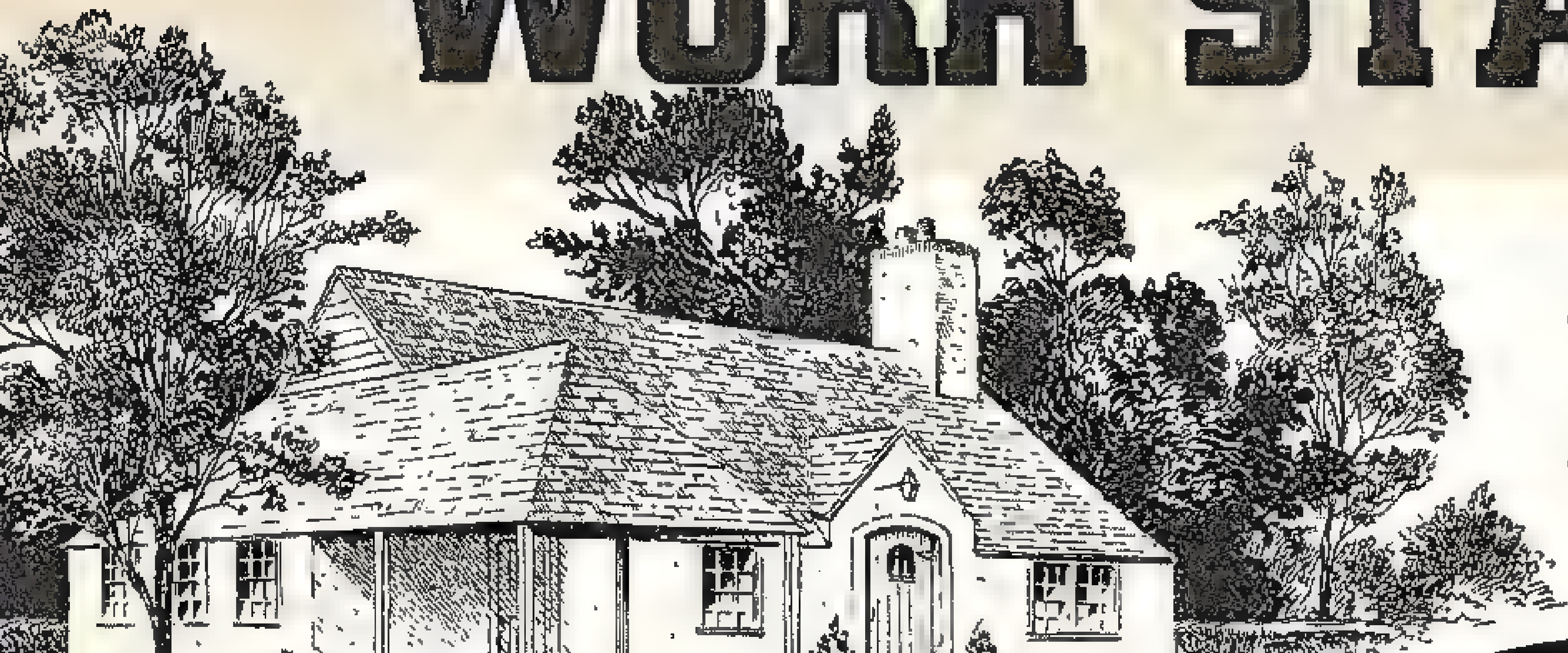
We sure envy Mr. Hoyt. He'll be able to make some excellent cruises in BUDDY. He has reason to be proud of her for she is a trim craft and pleasing to the eye.

***

Winter weather always spurs the snow-sled fans and they don't forget to send photos to their

[Continued on page 26]

WORK STARTS on MM HOME



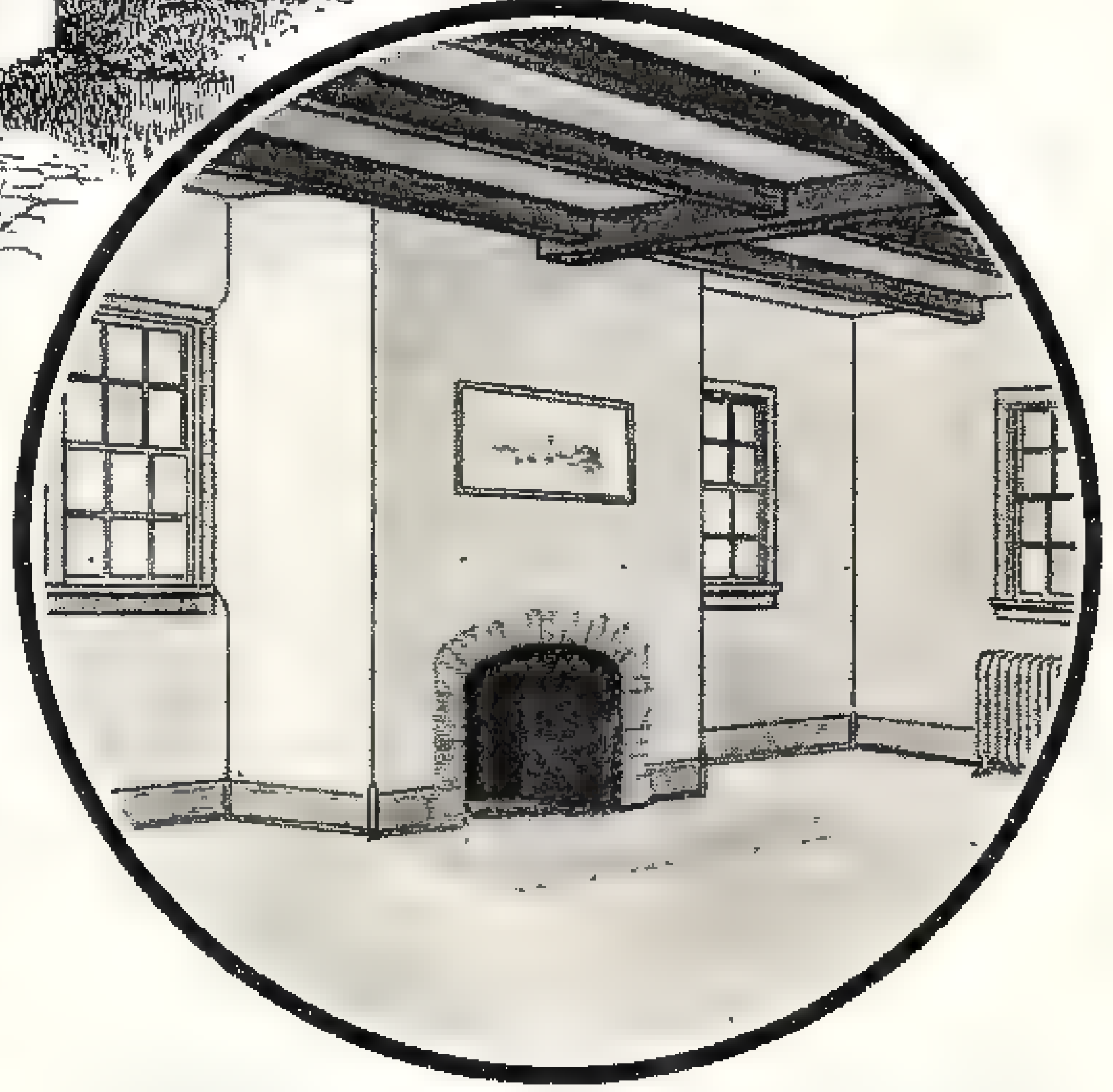
Architect helps builder obtain best for money.

by Wesley Sherwood Bessell

New York Architect

Wesley Sherwood Bessell, the author, is well known for the homes, schools and postoffices designed by him in recent years in Long Island and New Jersey.

This attractive $3,500 model residence is being constructed by Modern Mechanix in Leonia, N. J., five minutes' drive from the George Washington Bridge over Hudson River. It will demonstrate the ease with which the average man can finance and build his home.



Specifications for the home call for a brick wood-burning fireplace in addition to a steam heating system designed to maintain an even temperature of seventy degrees even in sub-zero weather.

CONVINCED of the ease of building their own homes, Tom and Jim and their wives purchased their building lots. Now spread before them were the blueprints—the plans of dreams which a short while before seemed impossible. Yet they were fast coming true.

Jim had a small grocery store, $3,000 in savings and two children for whom he was doing his best in a crowded city flat. Tom, on the other hand, was a clerk earning $1,200 a year. After many years of strict economy he and Mary had managed to save $1,600. Jim liked to find his recreation puttering about in a home workshop; Tom was an amateur photographer, with a passion for doing his own dark-room work. Their city flats did not afford room for their hobbies.

They were discussing these one day when Bill Johnson, who worked in an architect's office, showed them how his Boss could help them build their own homes which could be paid for at a cost cheaper than rent.

Tom's home—a one-story, four-room house to be built at a cost of $3,500 in Leonia, N. J., a few minutes from the George Washington Bridge that connects New York and New Jersey—has been selected as a model home by this magazine, and construction is under way.

Tom learned that with $1,230 in cash—including $600 for his lot—he could secure a loan of the additional $2,870 necessary from an independent building and loan association or one connected with the Federal Home Loan Bank or the Federal Housing Administration. The loan, payable at $29 a month, must be paid back in ten years.

Jim, because of his two children, required a bigger house. His two-story, five-room home will cost $5,500. Of this amount he has $1,890 cash, and must seek a loan of $4,410, which he must pay back at the rate of $45 a month for the next ten years.

Since the day they decided they could afford to build their homes things had been moving rapidly. Everything was ready now to submit to the contractors.

The blueprints of plans and elevations of both houses, with specifications fully explaining just what must be built into the homes and how to do it, included all the suggestions that Tom, Jim and their wives had made.

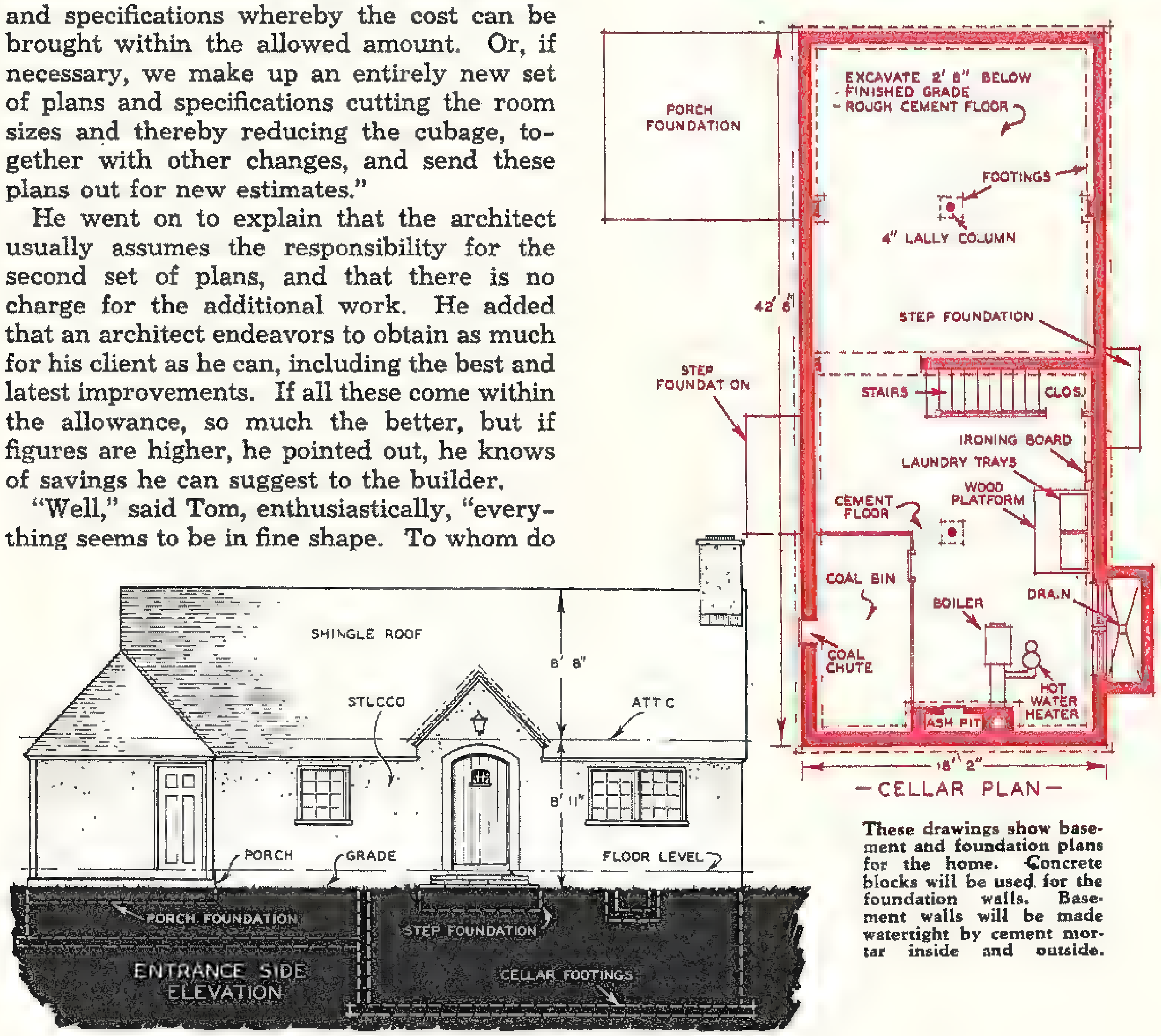
All the ideas that they desired in a home were carefully worked out. The plans were drawn up to a scale of one-quarter inch to the foot, and were similar to the original smaller sketches but with such changes as they had carefully discussed. It was agreed that requests for estimates be made at once.

"But what if the figures run more than our allowances?" asked Tom.

"In that case," Bill answered, "we usually call in the two lowest bidders and suggest that certain modifications be made in the plans and specifications whereby the cost can be brought within the allowed amount. Or, if necessary, we make up an entirely new set of plans and specifications cutting the room sizes and thereby reducing the cubage, together with other changes, and send these plans out for new estimates."

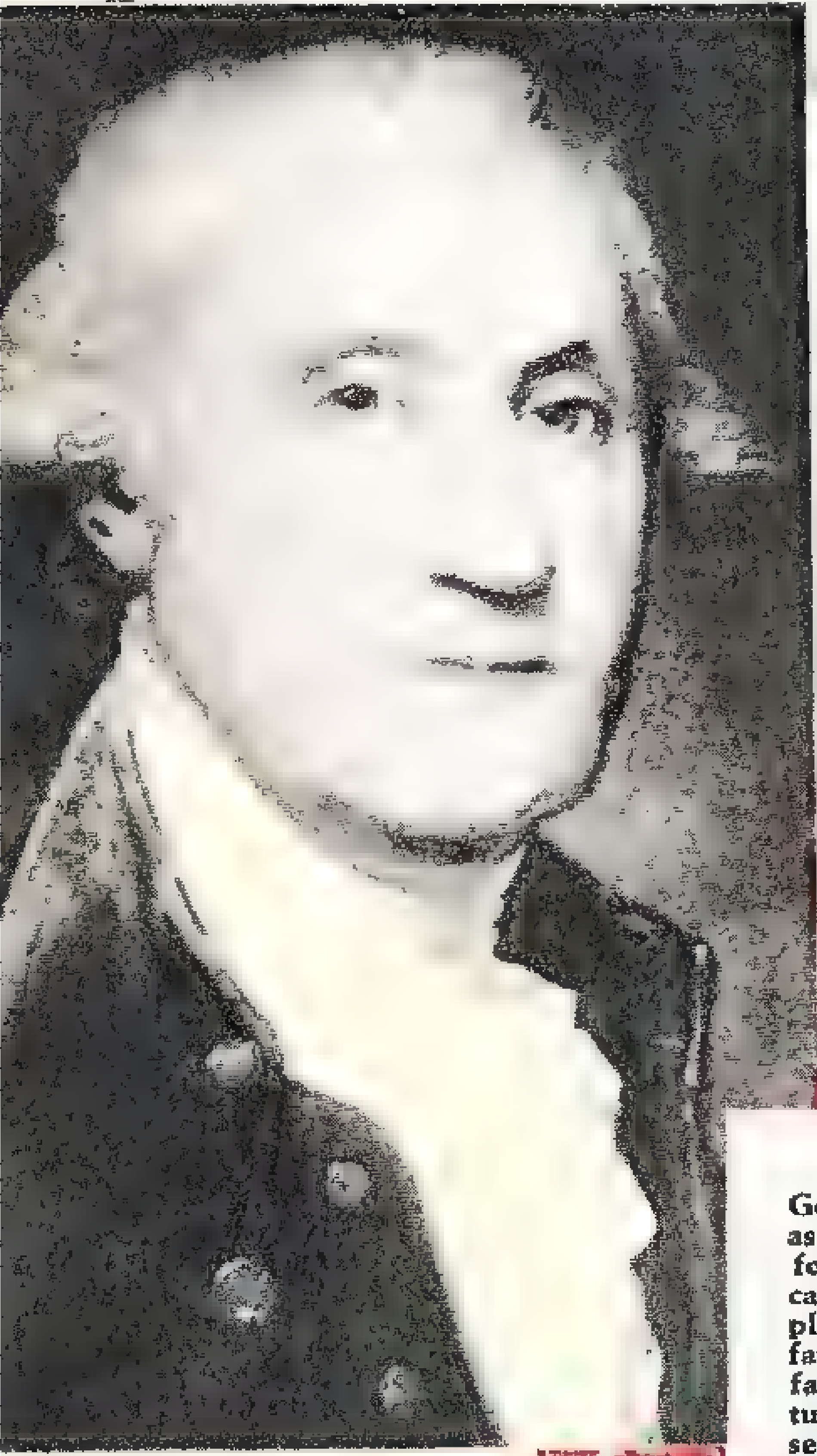
He went on to explain that the architect usually assumes the responsibility for the second set of plans, and that there is no charge for the additional work. He added that an architect endeavors to obtain as much for his client as he can, including the best and latest improvements. If all these come within the allowance, so much the better, but if figures are higher, he pointed out, he knows of savings he can suggest to the builder.

"Well," said Tom, enthusiastically, "everything seems to be in fine shape. To whom do



These drawings show basement and foundation plans for the home. Concrete blocks will be used for the foundation walls. Basement walls will be made watertight by cement mortar inside and outside.

GREAT INVENTIONS of FAMOUS MEN



by Aubrey D. McFadyen

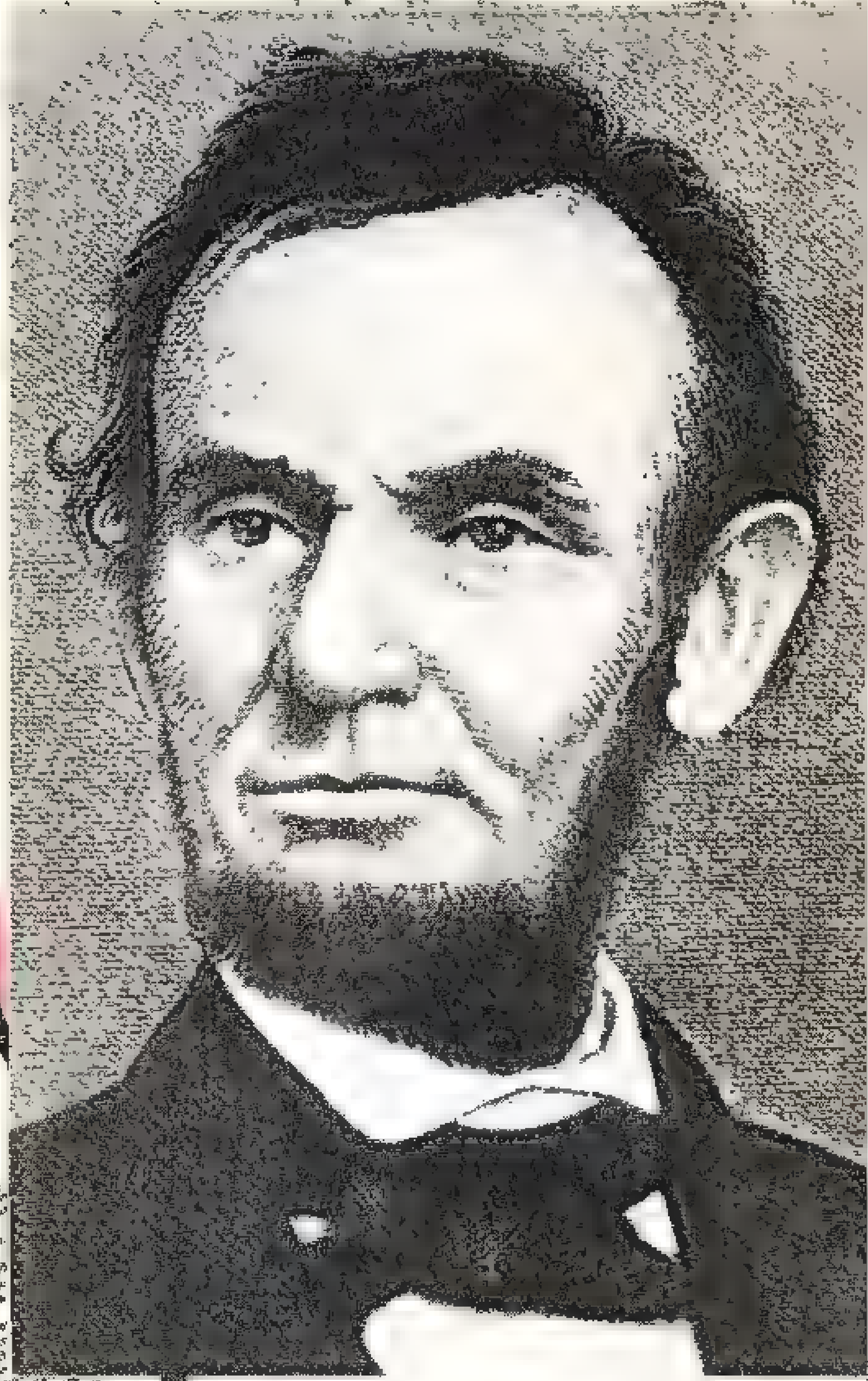
SENATOR WILLIAM G. McADOO'S fingers were burned at a picnic when he picked up a metal thermos bottle cap-cup full of hot coffee. So he went home and invented a heat-proof cap. The Senator's latest patent covers improvements in the familiar safety razor—the new razor being constructed so that the blade can be inserted or removed without taking the razor apart.

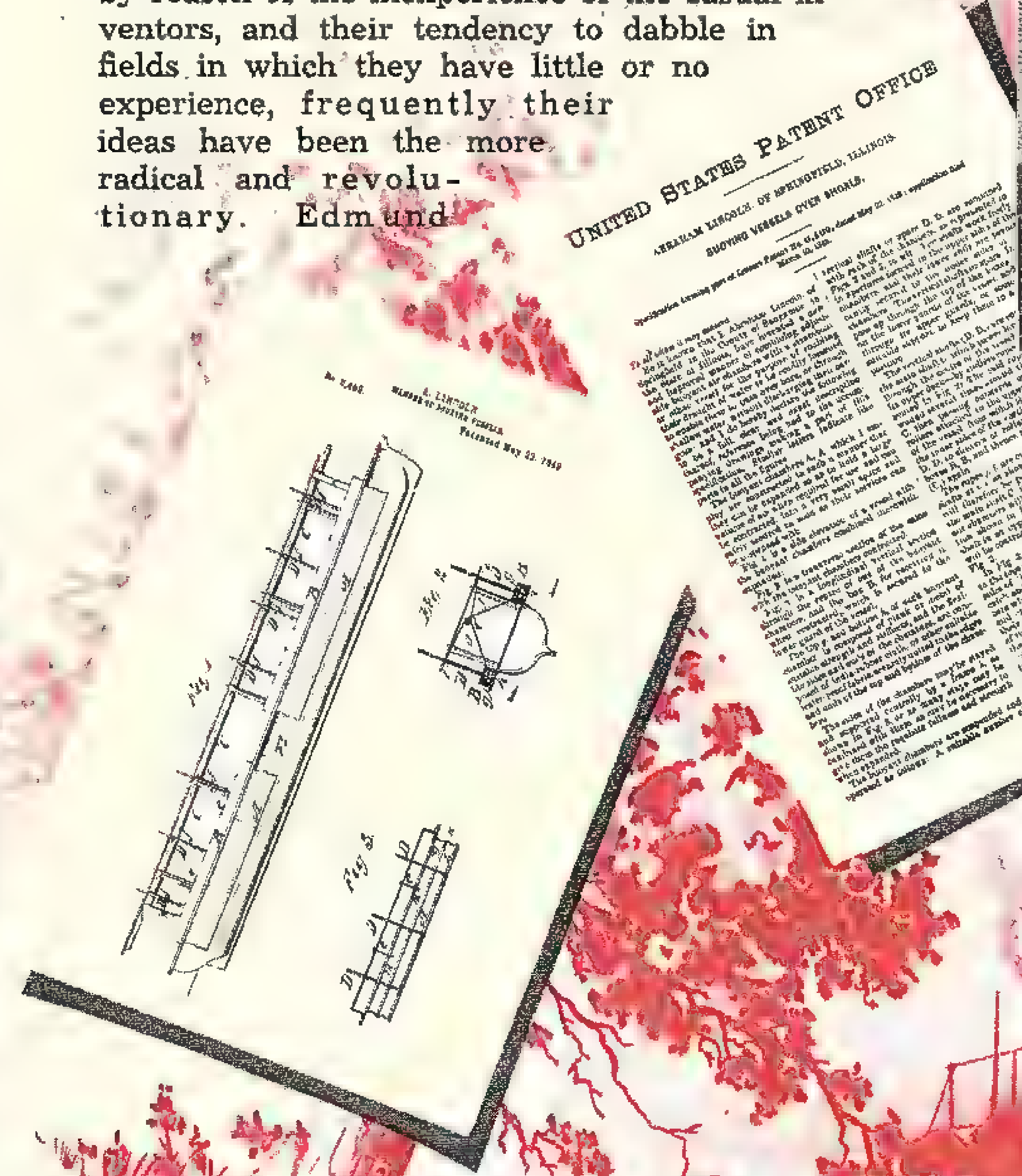
To such casual inventors the world is indebted for most of the 2,059,187 inventions patented in the United States during the 100 years existence of the American patent system, the centennial of which was observed in Washington on November 23.

Everybody, from Presidents to prisoners, has been inventing all manners of things. It excites little wonder when an eminent pianist patents numerous automobile structure, or when a pugilist patents a monkey wrench, or even when a scion of one of the nation's wealthiest families patents a shoe polishing device. The name of Dr. Albert Einstein is so much in the daily print in connection with his theory of relativity that when he patents a novel refrigerating system it is not even regarded as news.

When one reads that Thomas A. Edison patented 1,101 inventions, that John F. O'Connor, Chicago railway engineer has patented 968, or that Carleton Ellis, Montclair, N. J., chemist, has patented nearly 700 inventions ,the conclusion is immediately drawn that professional inventors are the backbone of the Patent Office. Nothing is farther from the truth. Men like John F. O'Connor, Elihu Thomson, Carleton Ellis, Henry A. Wise Wood, Clyde C. Farmer, John Hays Hammond, Jr., and Ethan I. Dodds—all living inventors, each having patented over 300 inventions—are the exceptions. For every professional inventor there are hundreds of amateur or casual inventors. In fact, by reason of the inexperience of the casual inventors, and their tendency to dabble in fields in which they have little or no experience, frequently their ideas have been the more radical and revolutionary. Edmund

George Washington, pictured as painted by Gilbert Stuart, found time in his versatile career to invent a seeding plow, a wine coaster and other farm devices. Samuel Clemens, famed as Mark Twain, pictured at right. invented the self-pasting scrapbook which can still be purchased at stationery stores. The illustration is from his patent. He also invented an adjustable strap for the backs of waistcoats and trousers.

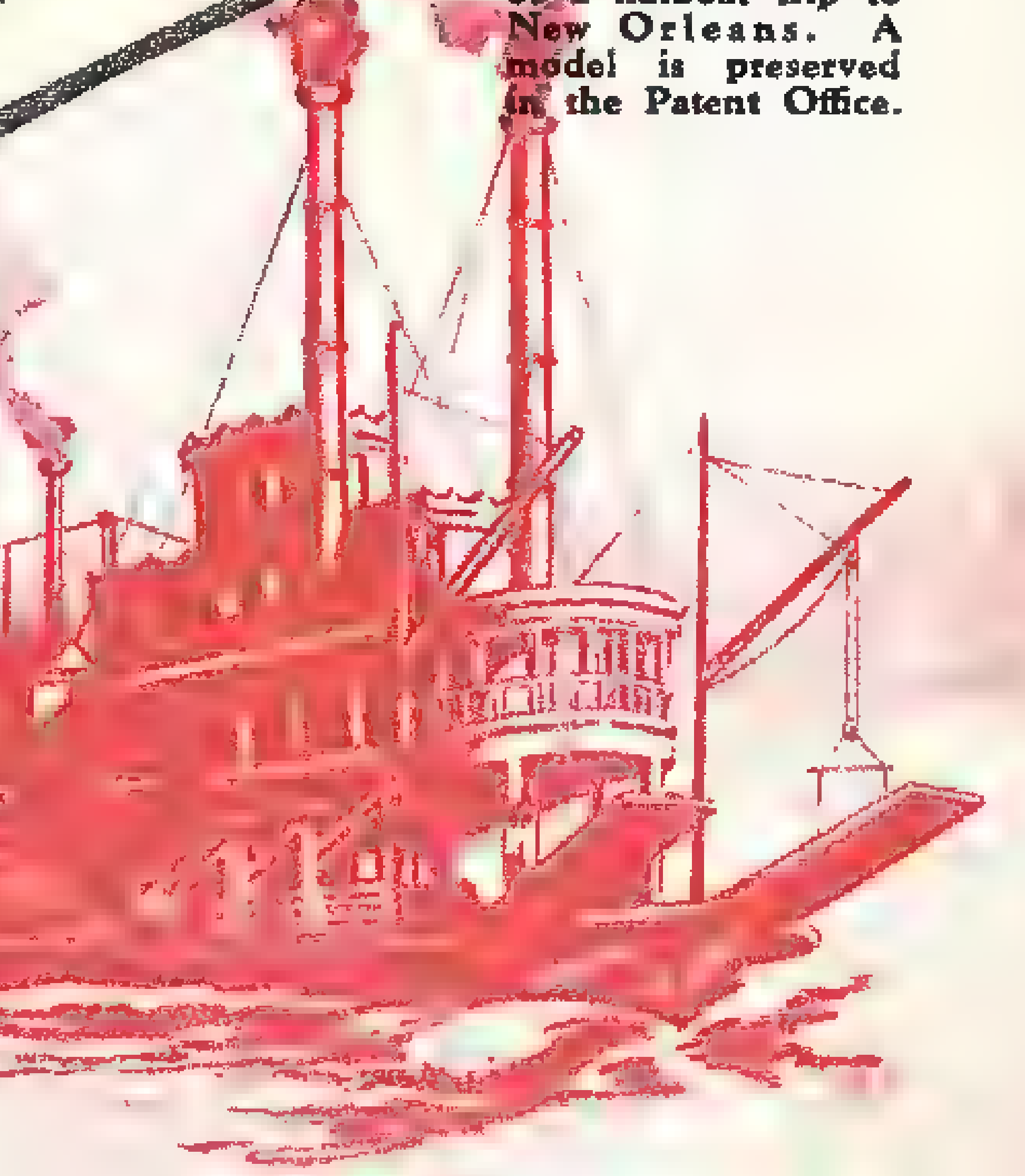




UNITED STATES PATENT OFFICE

ABRAHAM LINCOLN, OF SPRINGFIELD, ILLINOIS

BUOYING VESSELS OVER SHOALS.



Abraham Lincoln, famed for far different things, in 1849 invented and patented a system of buoyant chambers designed to help boats clear shoals in the Ohio and Mississippi Rivers. He was inspired by the difficulties of navigators which he witnessed in the course of a flatboat trip to New Orleans. A model is preserved in the Patent Office.

AROUND the WORLD By AIR

by H. R. Ekins

First Man to Circle Globe Via Air Lines

IT TOOK a flight around the world, entirely by air, to bring home to me the tremendous strides made by commercial aviation in the last ten years. For me the journey of little more than 18½ days, during which I flew a route of approximately 26,000 miles, was a study in aviation as it is today compared to what it was only a few years ago.

On my journey I used eight aircraft in all. The first was the German dirigible Hindenburg, the latest development in the science of lighter-than-air craft. The designers, builders and operators of the Hindenburg expect, however, that soon it will be surpassed by new giant ships of the air.

The other seven aircraft were of the heavier-than-air type. Three were used in the United States. They were twin-motored Boeings of the United Airlines and Douglas DC-2's of TWA—Transcontinental and Western Airways. The three planes which took me all the way from Frankfort, Germany, to Manila were made by Douglas, and the long trans-Pacific hop was aboard Pan-American Airways' "Hawaii Clipper," the big four-motored flying boat built by Martin and powered by Pratt and Whitney.

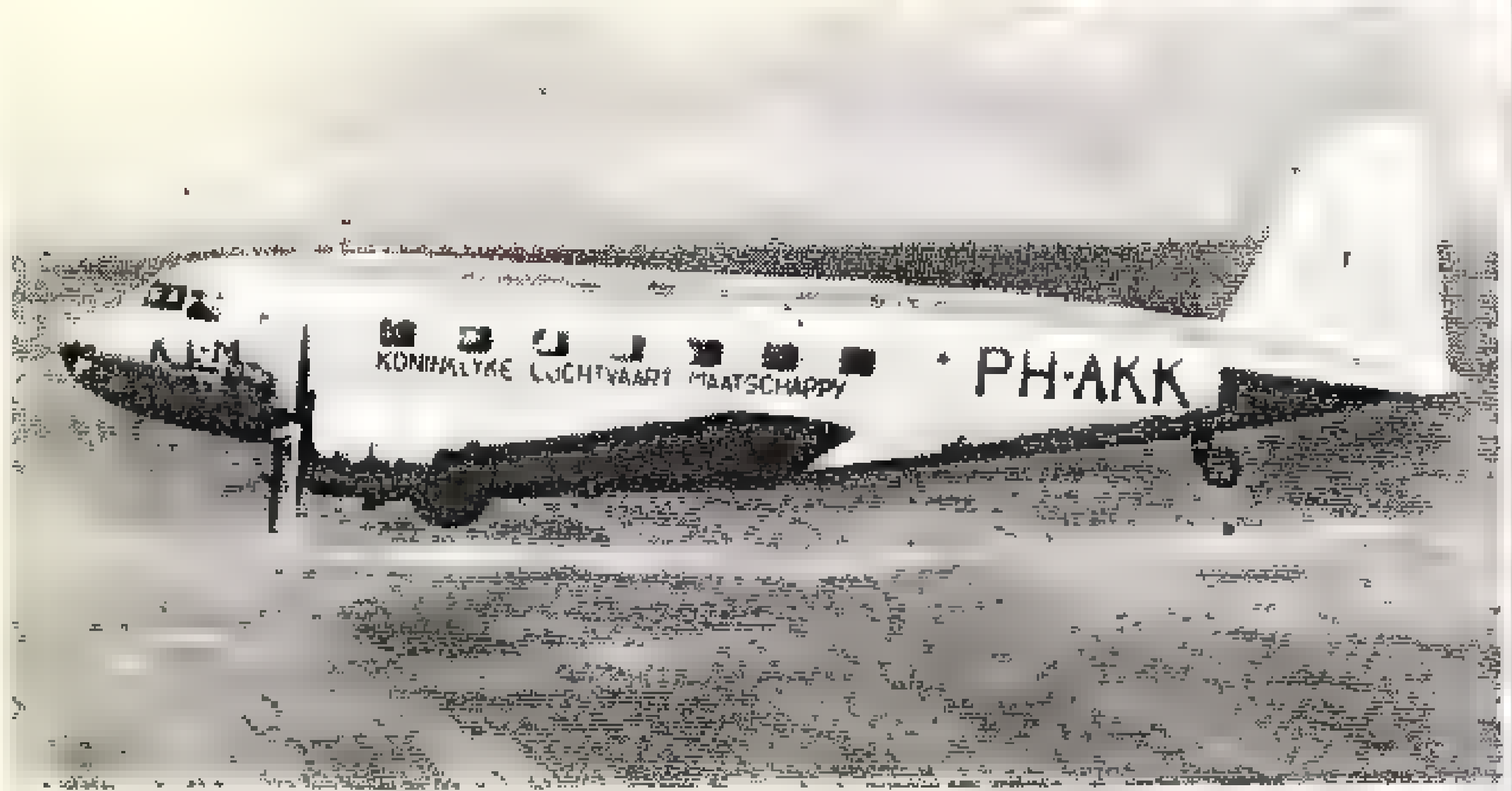
The aircraft listed above are the most modern and most efficient available to the civilian traveler. The study in contrasts, insofar as airplanes were concerned, began at Frankfort when I boarded a big Douglas airplane operated by KLM—Royal Dutch Airlines.

Six years ago, when I was flying around the Far East as a war correspondent for the United Press, the most powerful of the air-cooled radial engines of the Wright Cyclone type, were rated at about 525 horsepower.

In 1930 it was believed, on the basis of experience and research with the material then available, that it would be decidedly impractical to build an engine rated at more than 600 horsepower and still maintain even a vestige of dependability. Dependability in those days meant an engine that would operate for 250 hours between routine overhauls. By 1931 the power of the Wright Cyclone was increased to 575 horsepower by using slightly larger cylinders to obtain increased cubic inch displacement. During the same year advances in metallurgy and knowledge led engineers to believe that they had underestimated the possibilities of engines of the radial type.

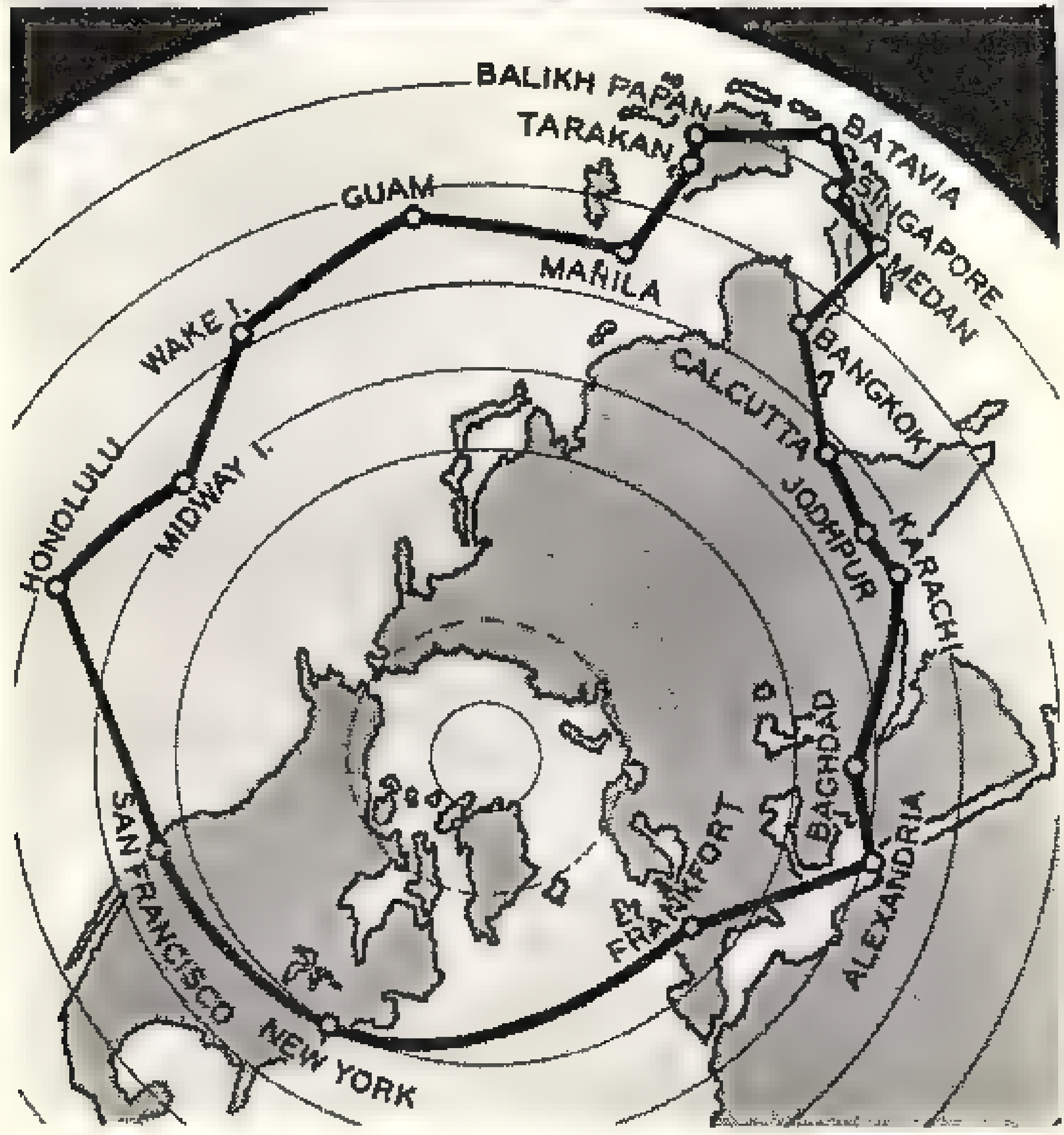
To jump a bit to the advances which had been made by the time I was ready to take off from Frankfort for the Orient I should like to point out the following:

All the way from Frankfort, Germany, to Batavia, Java, flying in only two planes, I flew behind 890 horsepower F-50 Cyclone engines. The plane of the Royal Netherlands-Indies Airways, which took me from Batavia, Java, to Manila, was powered with 715-horsepower Cyclones. When TWA flew me across the continent on the last leg of the journey they used a Douglas plane,



Above—The TWA Douglas transport plane that carried Ekins part way on his round-the-globe dash. Right—Ekins being congratulated by Miss F. W. Wilkins, TWA plane hostess, upon completing his race at Newark, N. J. Below—Dutch (K-L-M) Airline Douglas transports carried Ekins from Frankfort, Germany, to Batavia, Java.

Above—The German airship, Hindenburg, over N. Y. City. Ekins started his now famous trip from Lakehurst, N. J., aboard the giant dirigible on Sept. 30. Little more than 18½ days later, he circled Lakehurst in a TWA transport plane en route to Newark, N. J., having girdled the globe.



The route followed by Ekins on his record making flight, using only commercial airlines, is graphically shown above. The safety and comfort of American airplanes was Ekins' outstanding impression of the flight.

the Sky Chief. It was powered with F-50 Cyclones of an 890-horsepower rating.

The series F engines go back to 1932 when the Wright Aeronautical Corporation announced the development of engines rated at 700 horsepower at sea level. They weighed only two-tenths of a pound per horsepower more than the one pound per horsepower weight which the late Thomas A. Edison said was ideal for an aircraft engine. The success of the Cyclone F was immediate.

Its first commercial application was in the fleet of Douglas Airliners with which TWA equipped itself in 1934. The American and Eastern Airlines followed suit. Strangely enough, most of this I learned while flying with Dutch pilots across Europe, the Near East, and India to the Far East.

While flying over scorched, monotonous deserts I learned that in 1934 the leaders of Dutch commercial aviation were following developments in America closely. KLM negotiated with TWA to purchase one of its ships. TWA had the Douglas production tied up with priority rights.

The Dutch got their ship. Cyclone powered, it was used by two KLM pilots, Parmentier and Moll, in the McRobertson London-to-Australia air derby that involved 12,000 miles of flying. They took second place in the speed race and first place in the handicap division. By the time the race was over KLM had ordered a fleet of Douglas planes, all powered with Wright Cyclones.

The performances of Cyclones in Douglas airplanes used to establish records both in this country and abroad caused the Douglas Company to standardize on the Wright Cyclone engine for airliner installation. Of more than 150 Douglas airliners now in use only one, I believe, is powered with other than the standard engine.

It was the dependability of airplane engines that impressed me most as I flew around the world. I was actually in the air 8 days, 10 hours and 26 minutes, and to a man anxious to get home swiftly, yet safely, the matter of dependability was of utmost importance.

The motors behind which I flew in my early days as a passenger in airplanes would run dependably for only about 250 hours before overhaul. Now they will run at least 400 hours. Dutch engineers, great enthusiasts for American airplane power plants, told me that operation of 700 hours without overhaul is possible.

Several developments, I found as I flew, are responsible for the high efficiency of the mechanical facilities which enabled me to get around the world as fast as I did. They included the dynamic damper, a patented development removing all vibration from the engine. There were also improvements in cylinder head designs and better cooling which marked an important step towards increased power. In this connection we can look forward to further advances in supercharging which will allow greater power,

[*Continued on page* 150]

American airplanes equipped with Hamilton controllable pitch propellers like these above were instrumental in enabling Ekins to set a world's air travel record. They permit short takeoffs, maximum speed.

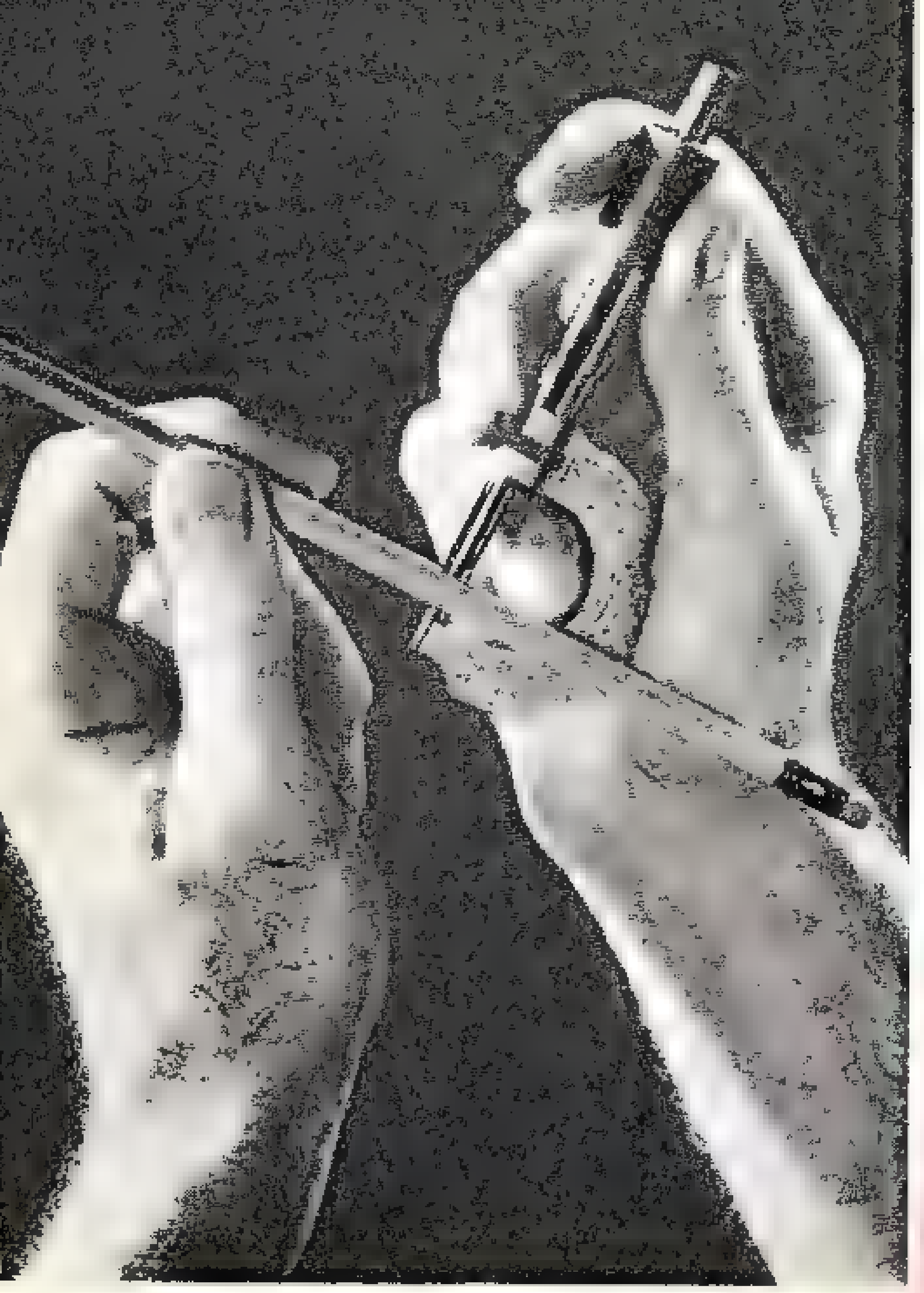
Ekins, 4,000 miles ahead of his racing rivals, shakes hands with the Dutch (K-L-M) Airline pilot who flew him from Athens, Greece, to Batavia, Java. Dutch airlines favor American airplanes and engines.

TWA
THE
LINDBERGH LINE

Above—Completing a flight of almost 26,000 miles in 18½ days, Ekins steps from a TWA Douglas transport at Newark, N. J., with a world's record for fast travel, using American aircraft most of the way.

BEHIND THE RAZOR BLADE

by Robert W. Gordon



Within the thickness of the pencil in the calipers, 20,000 thin razor edges can be stacked. Each edge is one-eighty-thousandth of an inch.

The oscillograph, an instrument that "sees" through steel, is used to detect hidden flaws.

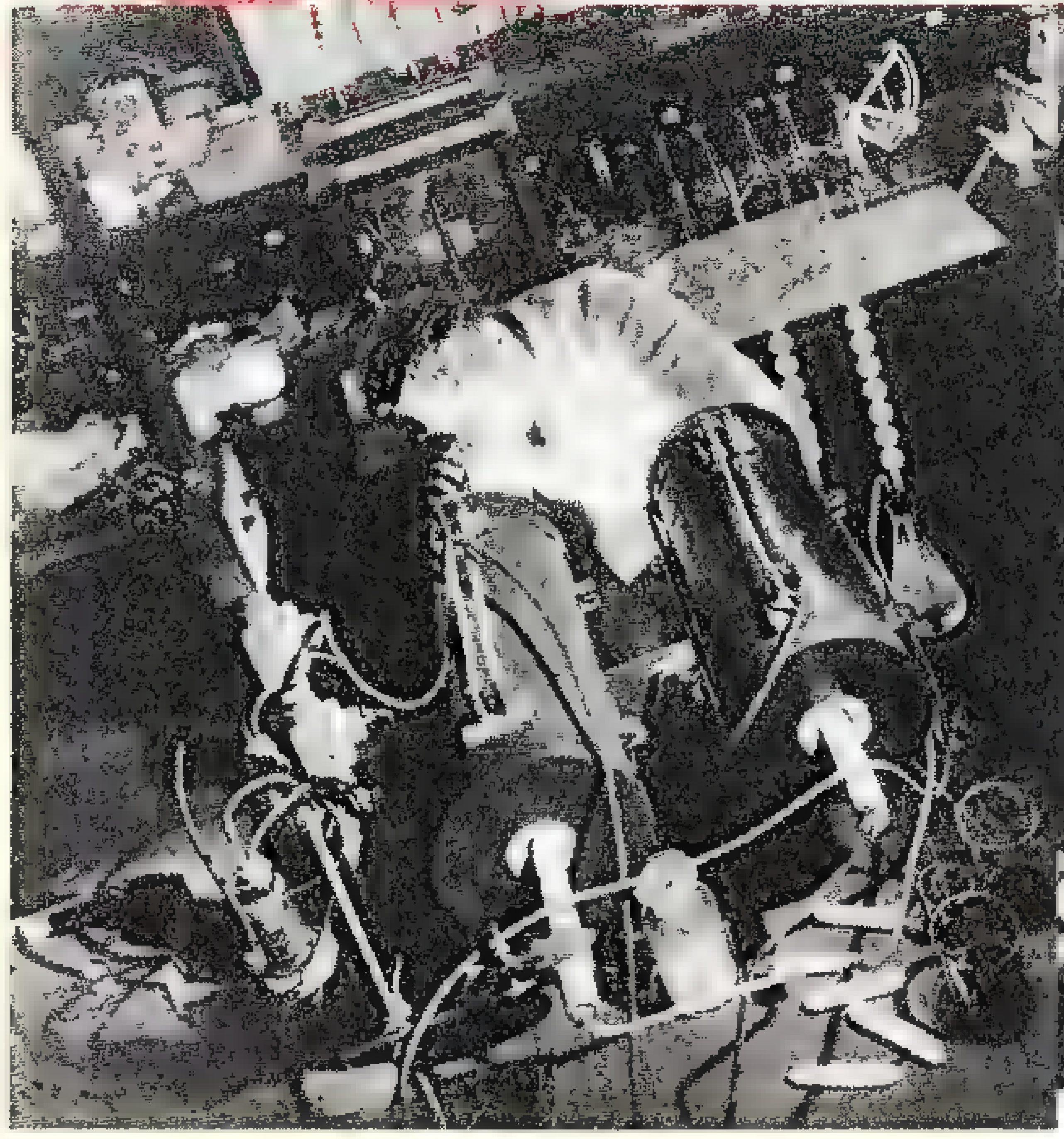
TAKE a look at any group photograph of half a century ago. No matter what their station in life, the faces of the men you see there will be adorned with luxuriant crops of whiskers. Some were clipped plain, with the simple dignity of a cemetery hedge. Others were brushed and trimmed in weird and wonderful designs, like decorations on a wedding cake.

Now take a look along the street—any street in almost any country. You see a new race of men entirely. You can really see their faces, and they are bright and clean. No more of this hiding behind the bush. Their jaws are as bare of foliage as an oak tree in January.

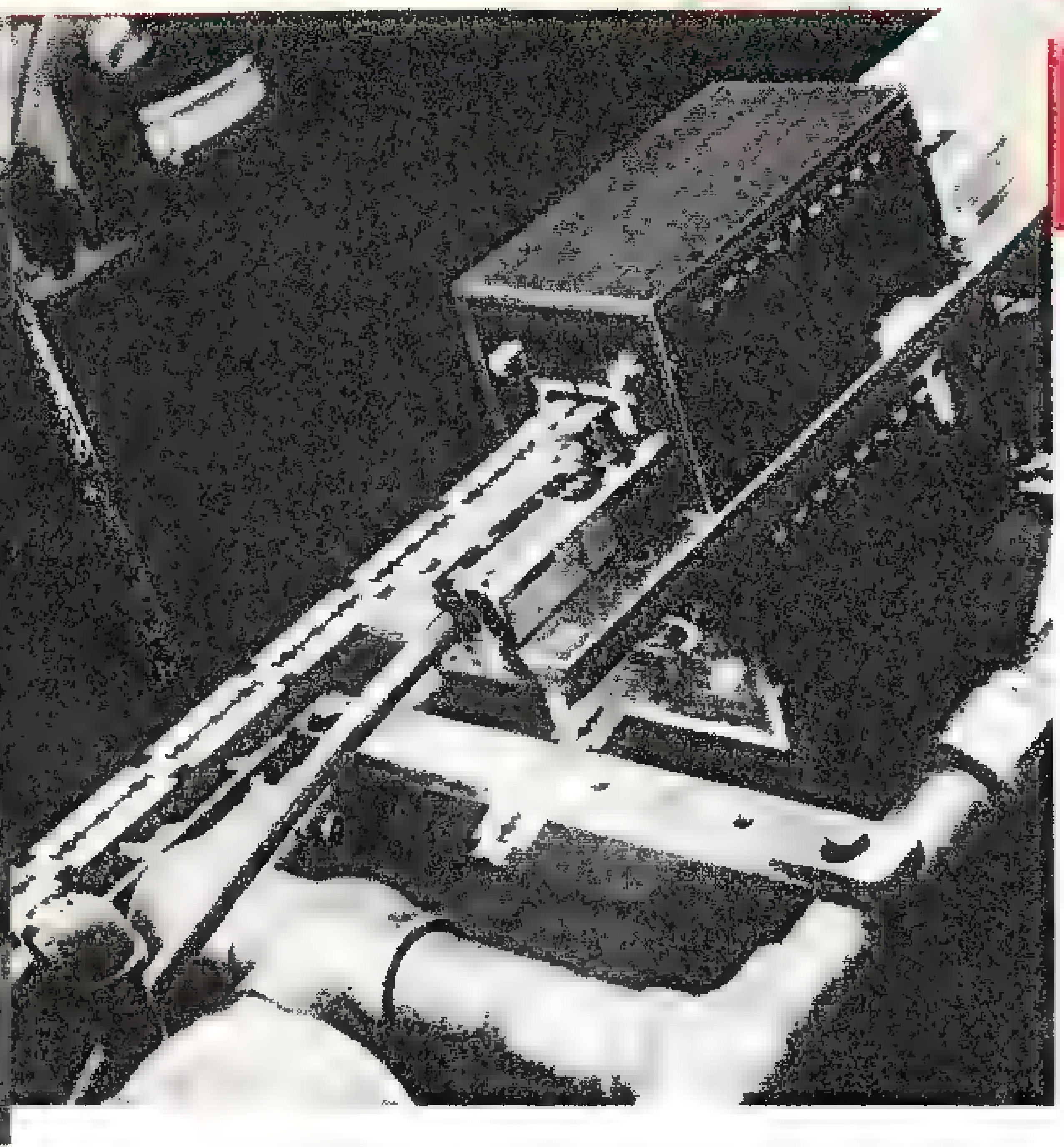
Has science given us a new race of whiskerless males?

You know it has not. The whisker crop is as bountiful as ever, but it is harvested earlier—harvested every morning by the majority of men throughout the world.

Now the only conclusion we can draw from this is that men never really liked whiskers any more than did the women. But down through the centuries, elimination of the beard remained an ordeal.



A sample goes into an electric furnace to be burned in a stream of oxygen. Vapors are analyzed to see that the proper proportion of carbon is present.

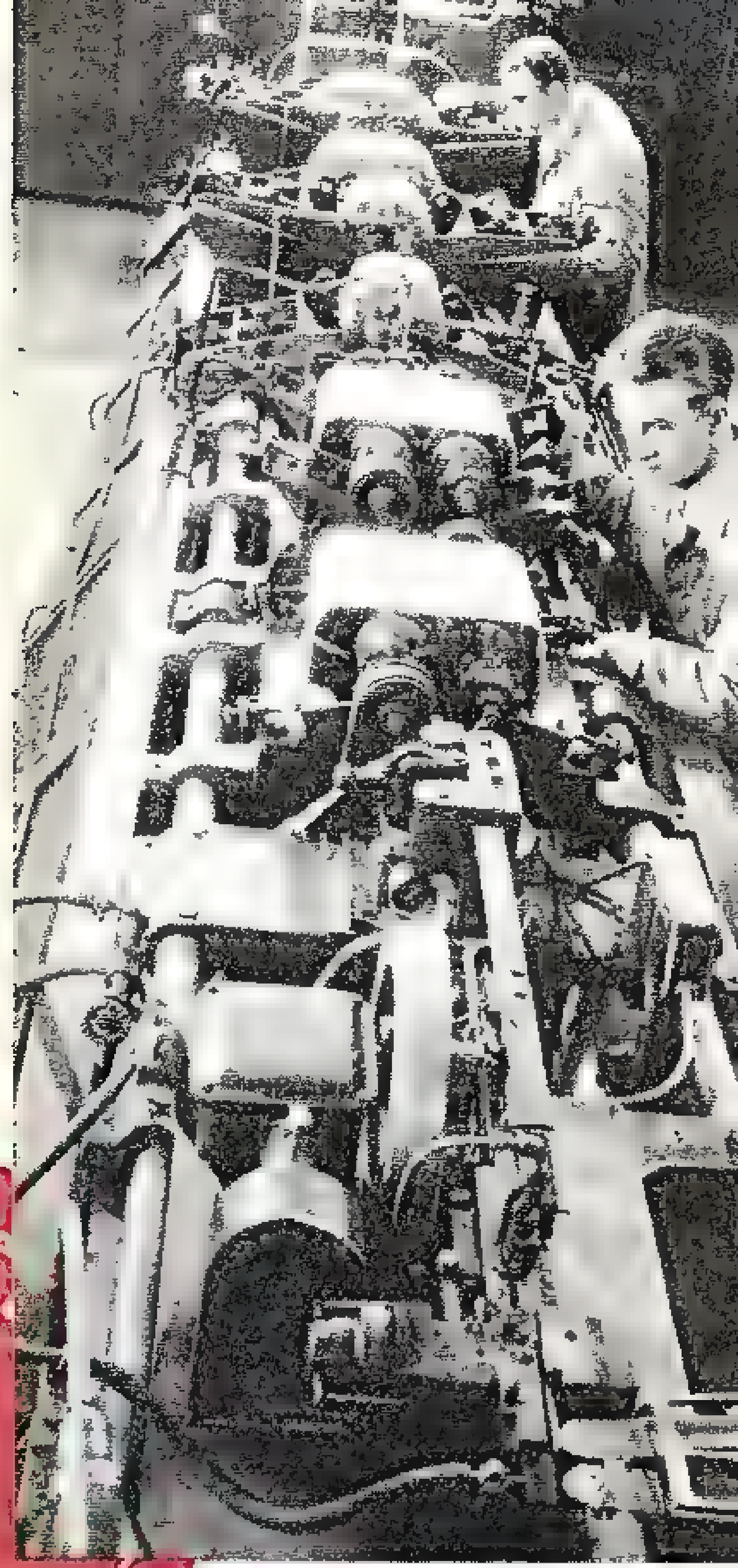


Variations in hardness are detected by this black box in the Gillette factory at Boston. If the steel in process above does not match the master strip below in hardness, the electricity going to furnace is varied.

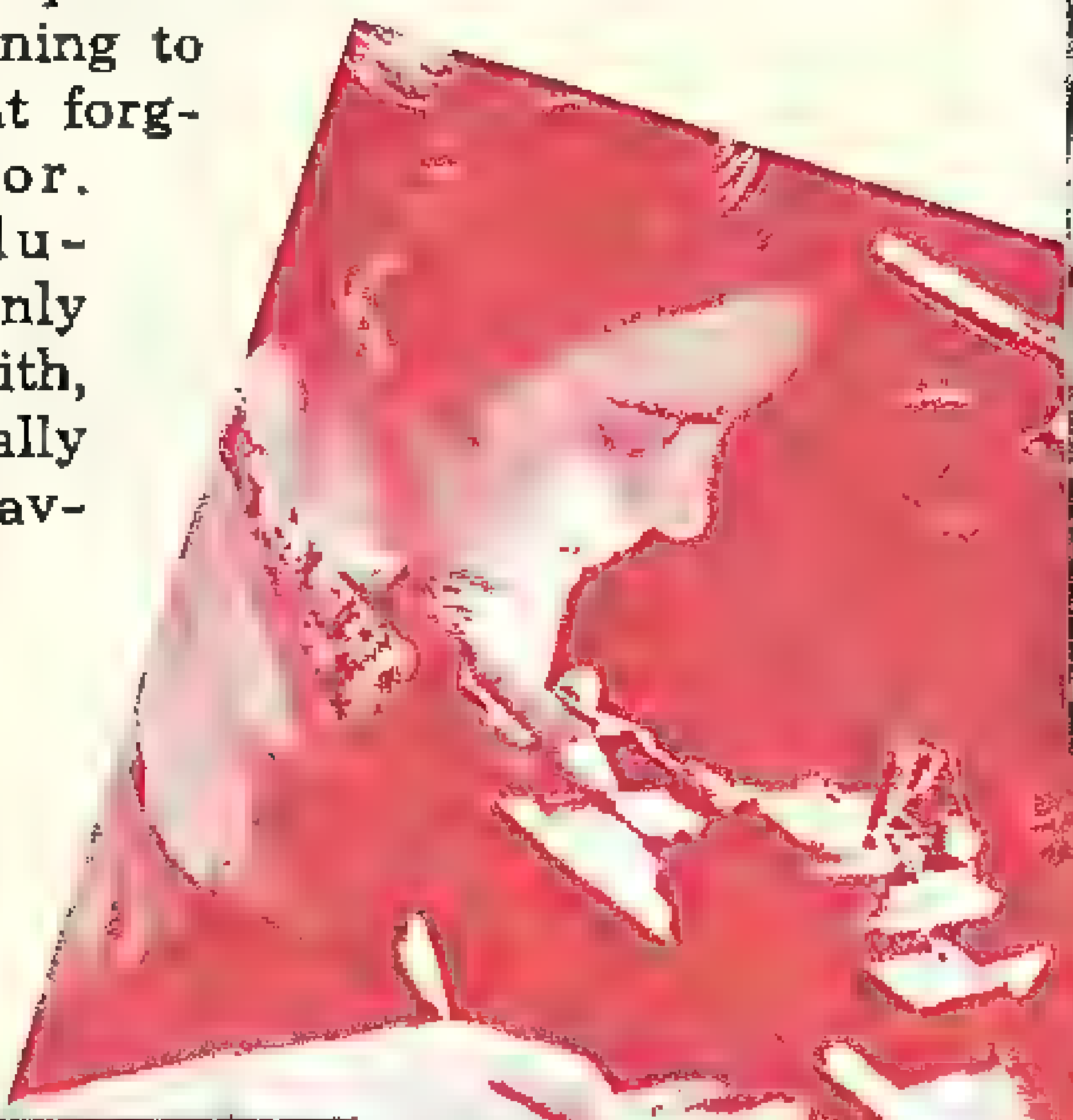
Then along came King C. Gillette in 1895 with the safety razor. Whiskers didn't disappear over night. Men were proud of the wiry toughness of their beards. You couldn't convince *them* that a little piece of metal stuck into a miniature double-edged hoe, could make shaving a painless, two-minute chore.

Even those few with faces too handsome to conceal, who went through the daily face-scraping with much the same martyr-to-looks spirit a woman assumes when getting a permanent, demanded a great steel forging, laboriously hollow ground, and equipped with a fancy handle. It required a lot of stropping and honing to keep a keen edge on that forging they called a razor.

Gillette had the revolutionary idea that it was only the edge you shaved with, and that the rest didn't really matter. He popularized shaving by developing an edge so sharp it is invisible, yet so cheap you can throw it away after using it once.



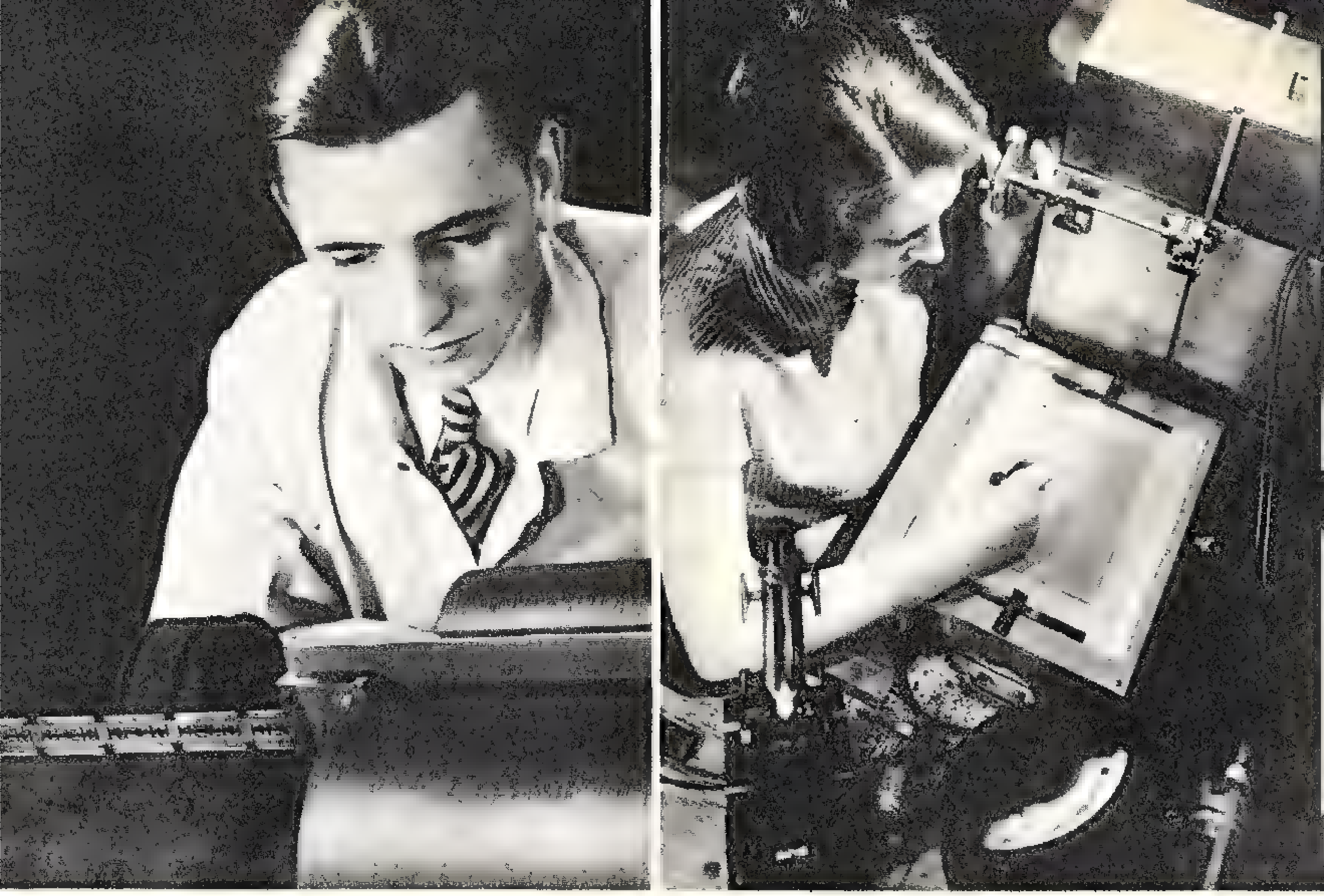
This machine performs one grinding, three honing and one stropping operation and cuts and stacks the blades on racks.



Samples of each coil are submitted to the diamond test for hardness. If it fails in the requirements, coil is rejected.

And the edge of the razor blade actually is invisible, even when looked at through the highest-powered microscope. The cutting edges of 80,000 blades, laid side by side, would occupy only one inch of space.

They demonstrate this absolute invisibility at the factory in Boston. They will show you a stack of blades a foot high, clamped together on a special holder. So accurately are the blades cut that the unsharpened ends appear as one solid bar of shining steel. Now turn the stack on edge. You see no shining metal there—only solid black. There is not enough metal on the cutting edges of that stack of blades to reflect a single beam of light. You can photograph it and get nothing on the plate but a solid black rectangle. Place a single blade on its side under a high-power microscope, and there will be no saw-tooth effect—only a straight line. Place the blade



Blades are pictured at left during the sharpening process. Two sets of grinding wheels, one for each edge, first remove the rough stock. The girl at the right is operating the photoelectric sharpness testing machine.

As a final step in the long process, finished blades are sprayed with a powerful antiseptic solution. They are then wrapped and sealed.

on edge and you will see nothing. One-eighty-thousandth of an inch is too infinitesimal a point in space to be seen by the eye, even when aided by the highest-powered microscope science has produced.

To obtain a cutting edge so sharp, close control and microscopically-fine limits of accuracy are required for every operation of manufacture.

Swedish steel is used because of the high quality of Swedish raw materials and the long experience and great skill in rolling possessed by the Scandinavian mills. To insure uninterrupted production schedules with accompanying uniformity of quality, a tremendous steel inventory, representing an investment of several hundred thousand dollars, is carried in storage.

The coils of raw steel arrive from Sweden, each wrapped in heavy crepe paper, covered with oily waterproof paper, while the surfaces of the steel ribbons are coated with a special rust-proofing compound. Six coils are hermetically sealed in a tin container, which is protected by a wooden box. Thus protected, the shipping case could be immersed in sea water without damage to the contents.

As the cases are opened at the factory, a sample is cut from each end and tagged with the number of the coil. Another tag is placed on the coil itself, and follows the steel throughout the factory until the finished blades are packed. Each person who handles that particular coil, whether for manufacture or testing, must initial the tag. When the coil passes from one stage of manufacture to another, it is checked in and out of the control room. This intricate system of checking and rechecking makes it possible to detect flaws instantly and trace them to their source. It makes it possible to guarantee that only perfect blades will be offered for sale.

The original samples of the soft cold-rolled steel are submitted to a series of rigid laboratory tests to see that specifications for width, thickness, and metallurgical characteristics are fulfilled, and only when these tests are completed, and an O. K. placed on the tag. is the coil released for production.

Width and thickness are checked by micrometer gauges, and the variations permitted are infinitesimally small. A sample is then placed in the oscillograph, an instrument that virtually sees through steel. Hidden flaws, strains resulting from improper rolling, incorrect micro-structure, are instantly detected.

Samples of each coil are then sent to the laboratory and microphotographed at 3,000 diameters. A trained metallurgist studies these photographs to determine if the inner structure, the combination of elements making up the metal, is suitable for blades.

Another sample goes into an electric furnace, to be burned in a stream of oxygen. Vapors resulting from this combustion are analyzed chemically to see that exactly the right proportion of carbon is present.

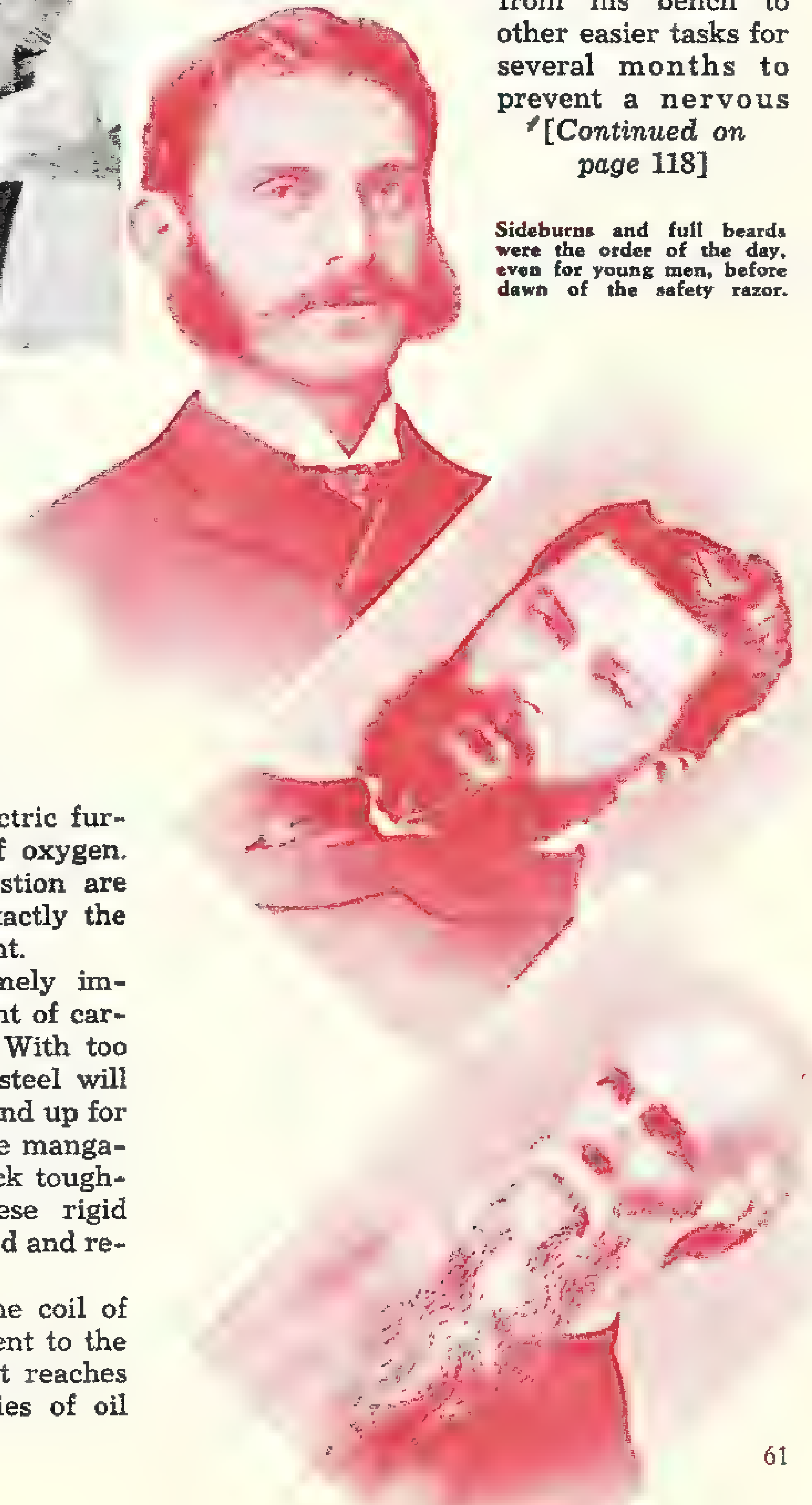
This chemical content is extremely important. Without the proper amount of carbon the steel will lack hardness. With too much sulphur or phosphorus, the steel will not yield a cutting edge that will stand up for a number of shaves. With too little manganese or chromium, the steel will lack toughness. Metal failing to meet these rigid laboratory tests is immediately crated and returned to Sweden.

If approved in the laboratory, the coil of soft steel is wound on a reel and sent to the perforating machine. But before it reaches the dies it feeds through two series of oil wipers, which remove any foreign matter adhering to the strip and add an oil which aids the perforating die and prevents rust between this and the next operation.

These dies that punch out the center slot are the acme of accuracy. They must be if the blade is to be held in the razor at the correct position for a proper shave. Unable to obtain such accuracy elsewhere, the factory employs its own corps of die cutters, any one of whom could grind the print off this page without removing a particle of the paper.

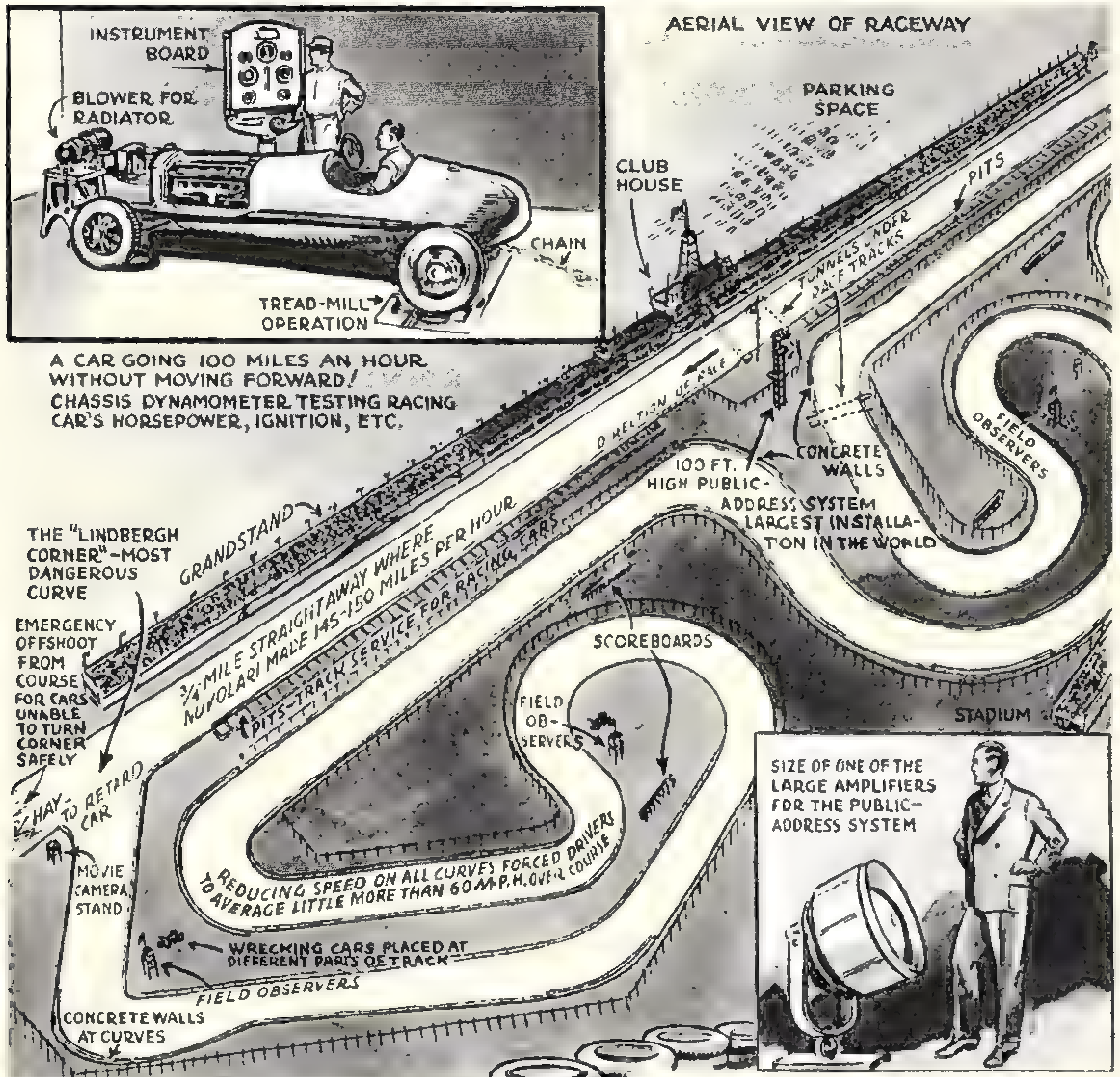
So critical is the workmanship demanded here that in certain cases it has been necessary to release a man from his bench to other easier tasks for several months to prevent a nervous

[*Continued on page* 118]



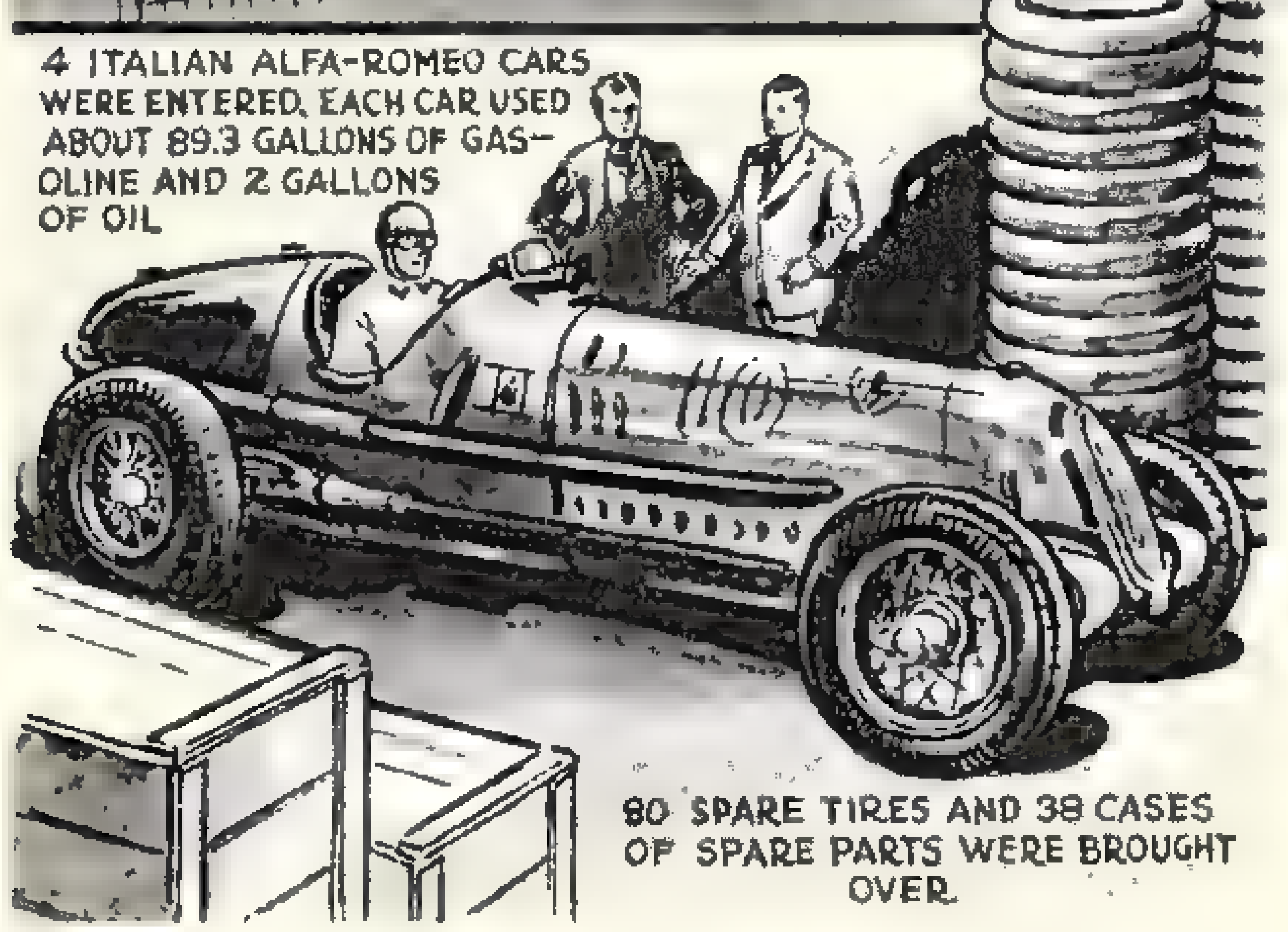
Sideburns and full beards were the order of the day, even for young men, before dawn of the safety razor.

AMERICA'S NEWEST AUTO RACE TRACK


AERIAL VIEW OF RACEWAY
INSTRUMENT BOARD
BLOWER FOR RADIATOR
CHAIN
TREAD-MILL OPERATION
PARKING SPACE
CLUB HOUSE
PITS
TUNNELS UNDER RACE TRACKS
DIRECTION OF RACE
CONCRETE WALLS
100 FT. HIGH PUBLIC-ADDRESS SYSTEM LARGEST INSTALLATION IN THE WORLD
FIELD OBSERVERS
GRANDSTAND
THE "LINDBERGH CORNER"-MOST DANGEROUS CURVE
EMERGENCY OFFSHOOT FROM COURSE FOR CARS UNABLE TO TURN CORNER SAFELY
3/4 MILE STRAIGHTAWAY WHERE NUVOLARI MADE 145-150 MILES PER HOUR
PITS-TRACK SERVICE FOR RACING CARS
SCOREBOARDS
FIELD OBSERVERS
STADIUM
HAY-TO RETARD CAR
MOVIE CAMERA STAND
REDUCING SPEED ON ALL CURVES FORCED DRIVERS TO AVERAGE LITTLE MORE THAN 60 M.P.H. OVER COURSE
WRECKING CARS PLACED AT DIFFERENT PARTS OF TRACK
FIELD OBSERVERS
CONCRETE WALLS AT CURVES

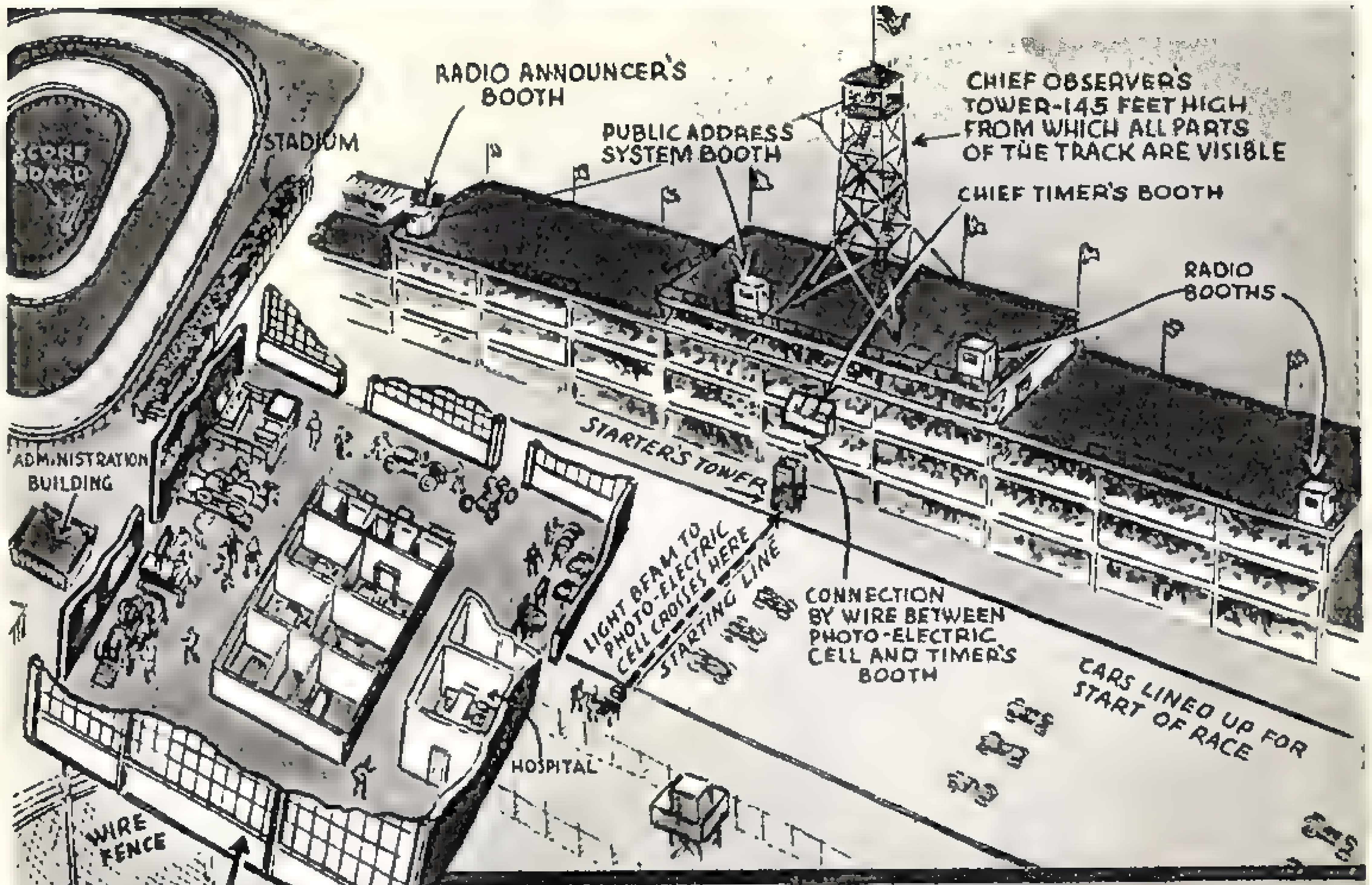
A CAR GOING 100 MILES AN HOUR WITHOUT MOVING FORWARD! CHASSIS DYNAMOMETER TESTING RACING CAR'S HORSEPOWER, IGNITION, ETC.

SIZE OF ONE OF THE LARGE AMPLIFIERS FOR THE PUBLIC-ADDRESS SYSTEM

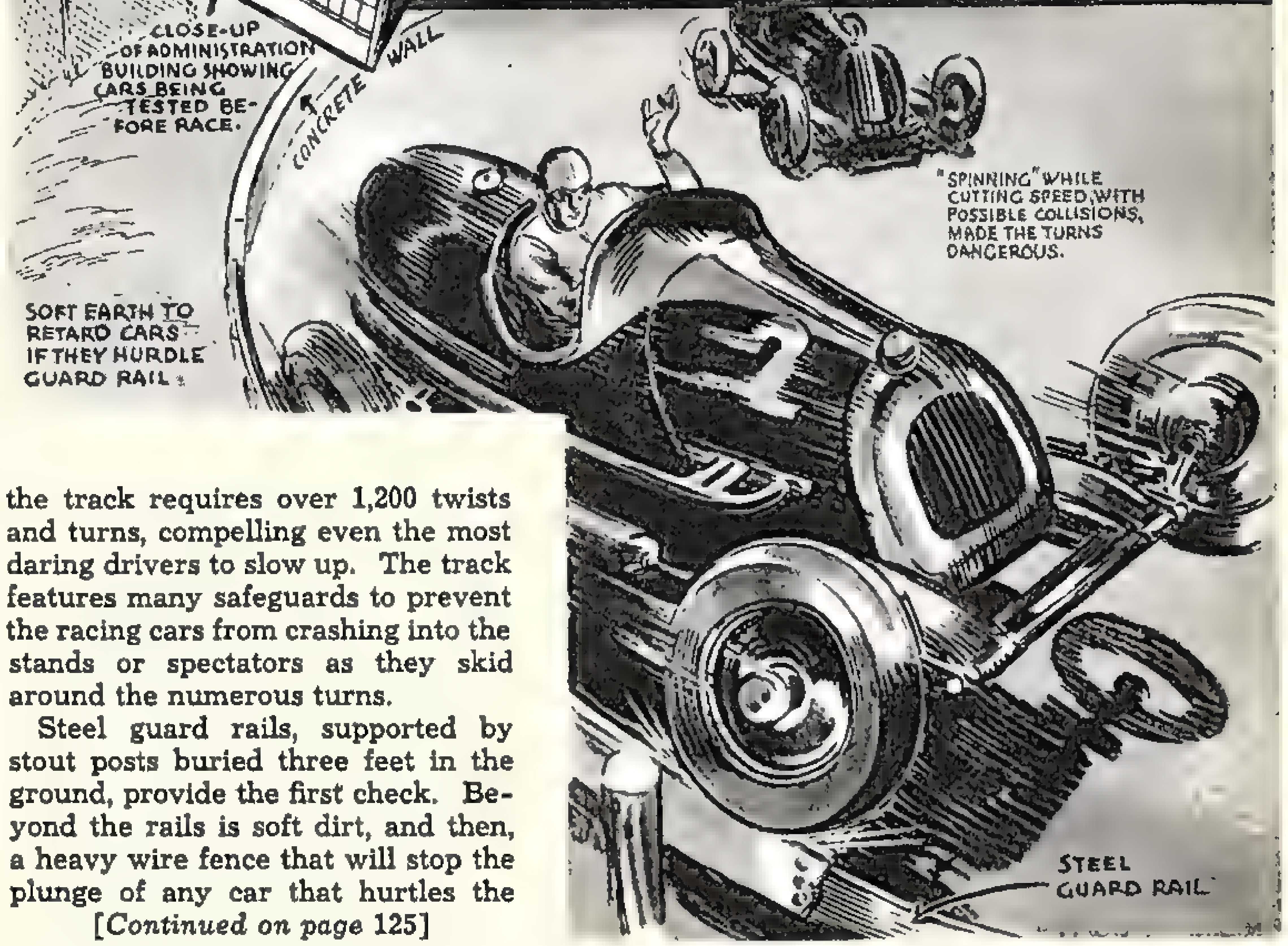


4 ITALIAN ALFA-ROMEO CARS WERE ENTERED, EACH CAR USED ABOUT 89.3 GALLONS OF GASOLINE AND 2 GALLONS OF OIL

80 SPARE TIRES AND 38 CASES OF SPARE PARTS WERE BROUGHT OVER


SCORE BOARD
STADIUM
RADIO ANNOUNCER'S BOOTH
PUBLIC ADDRESS SYSTEM BOOTH
CHIEF OBSERVER'S TOWER-145 FEET HIGH FROM WHICH ALL PARTS OF THE TRACK ARE VISIBLE
CHIEF TIMER'S BOOTH
RADIO BOOTHS
ADMINISTRATION BUILDING
STARTER'S TOWER
LIGHT BEAM TO PHOTO-ELECTRIC CELL CROSSES HERE
STARTING LINE
CONNECTION BY WIRE BETWEEN PHOTO-ELECTRIC CELL AND TIMER'S BOOTH
CARS LINED UP FOR START OF RACE
HOSPITAL
WIRE FENCE

CLOSE-UP OF ADMINISTRATION BUILDING SHOWING CARS BEING TESTED BEFORE RACE.


CONCRETE WALL
SOFT EARTH TO RETARD CARS IF THEY HURDLE GUARD RAIL
STEEL GUARD RAIL

"SPINNING" WHILE CUTTING SPEED, WITH POSSIBLE COLLISIONS, MADE THE TURNS DANGEROUS.

ROOSEVELT RACEWAY, located at Westbury, L. I., is America's newest and most dangerous automobile race track. So dangerous is the four-mile track with its twists and turns that Tazio Nuvolari, of Italy, who won the Vanderbilt Cup and $24,000 of the $60,000 prize money at the opening race last Columbus Day, averaged only 65.998 m.p.h. in his Alfa-Romeo racer although he attained speeds of 145-150 m.p.h. on the straightaways.

The average 75-mile race staged at the track requires over 1,200 twists and turns, compelling even the most daring drivers to slow up. The track features many safeguards to prevent the racing cars from crashing into the stands or spectators as they skid around the numerous turns.

Steel guard rails, supported by stout posts buried three feet in the ground, provide the first check. Beyond the rails is soft dirt, and then, a heavy wire fence that will stop the plunge of any car that hurtles the

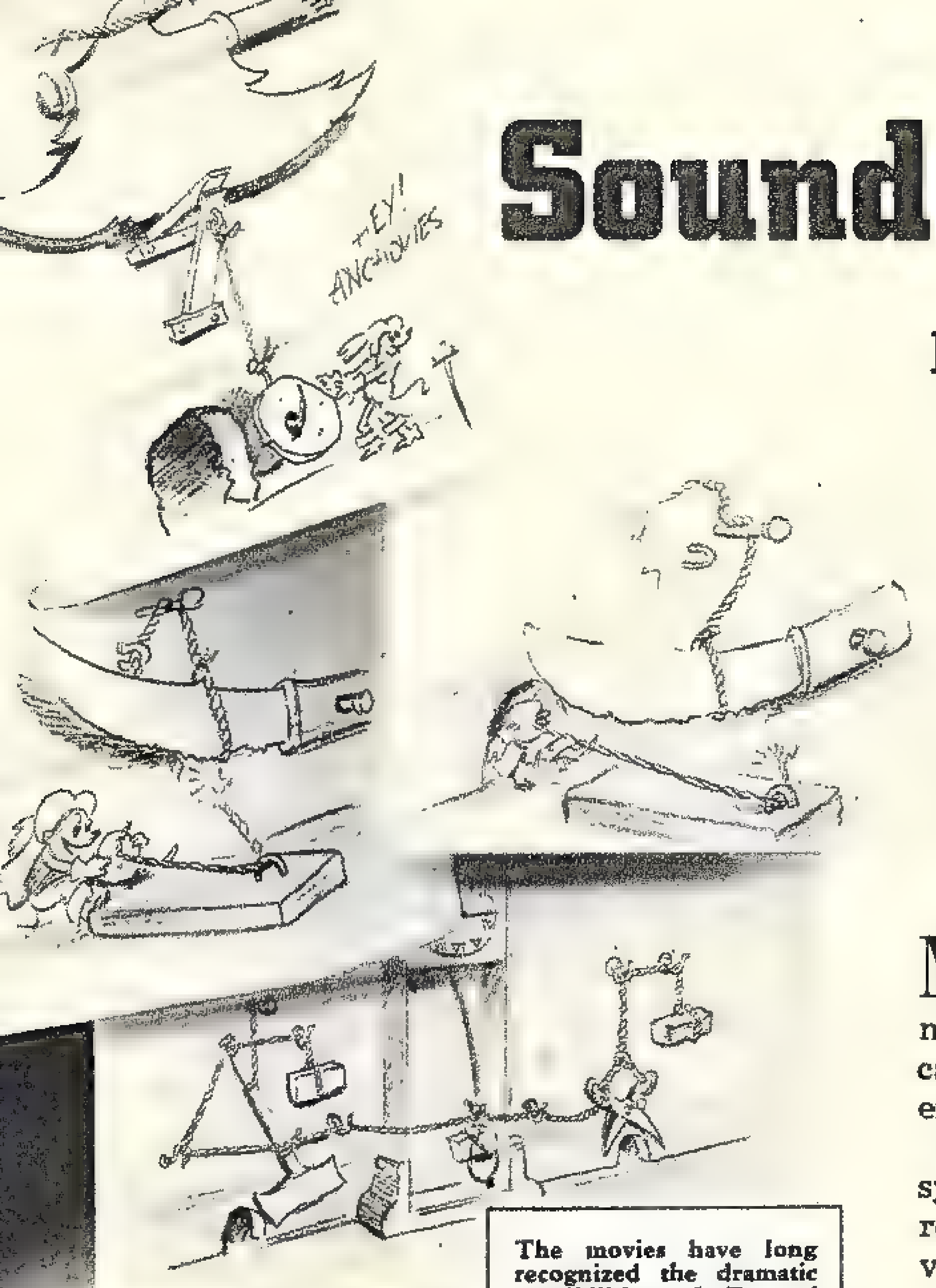
[*Continued on page 125*]

Sound Tricks of Mickey Mouse

by Earl Theisen

Illustrated by Walt Disney

Squeaks, squawks, oinks and music—it's another animated cartoon hit, set to music in a brand new way. Read how the hay baler joins a symphony.


HEY! ANCHOVIES

The movies have long recognized the dramatic possibilities of Dumas' *Three Musketeers*. It took Walt Disney to recognize the humorous possibilities of the *Three Mouseketeers*. Here are four "rough sketches" which outline the action.

MUSIC and noises in the animated cartoon interpret the action of the story. The narrative theme of the music and what is called the "sound effects" punctuates and emphasizes the story.

By playing on the aural nerves with symbolic sounds and noises the psychological reaction of the audience is controlled and varied according to the dramatic and emotional needs of the cartoon story.

If Donald Duck falls, for example, it is not enough for the sound man to hit a drum for the noise, but an additional sound characteristic must be added to convey a certain kind of fall. There are dozens of different "sound effects" for cartoon character falls which vary according to the story. When a sympathetic attitude is desired, the "fall" sound is hollow and devoid of jarring characteristics, while a harsh sound which shocks the aural nerves is created for that effect.

The associative value of sounds is widely used for humor, such as a tearing noise which accompanies the falling of a character. For humorous responses the "sound effect" is often caricatured and distorted. An example of this was the tire skidding noise used in "The Tortoise and the Hare" when the fast moving rabbit slid to a stop.

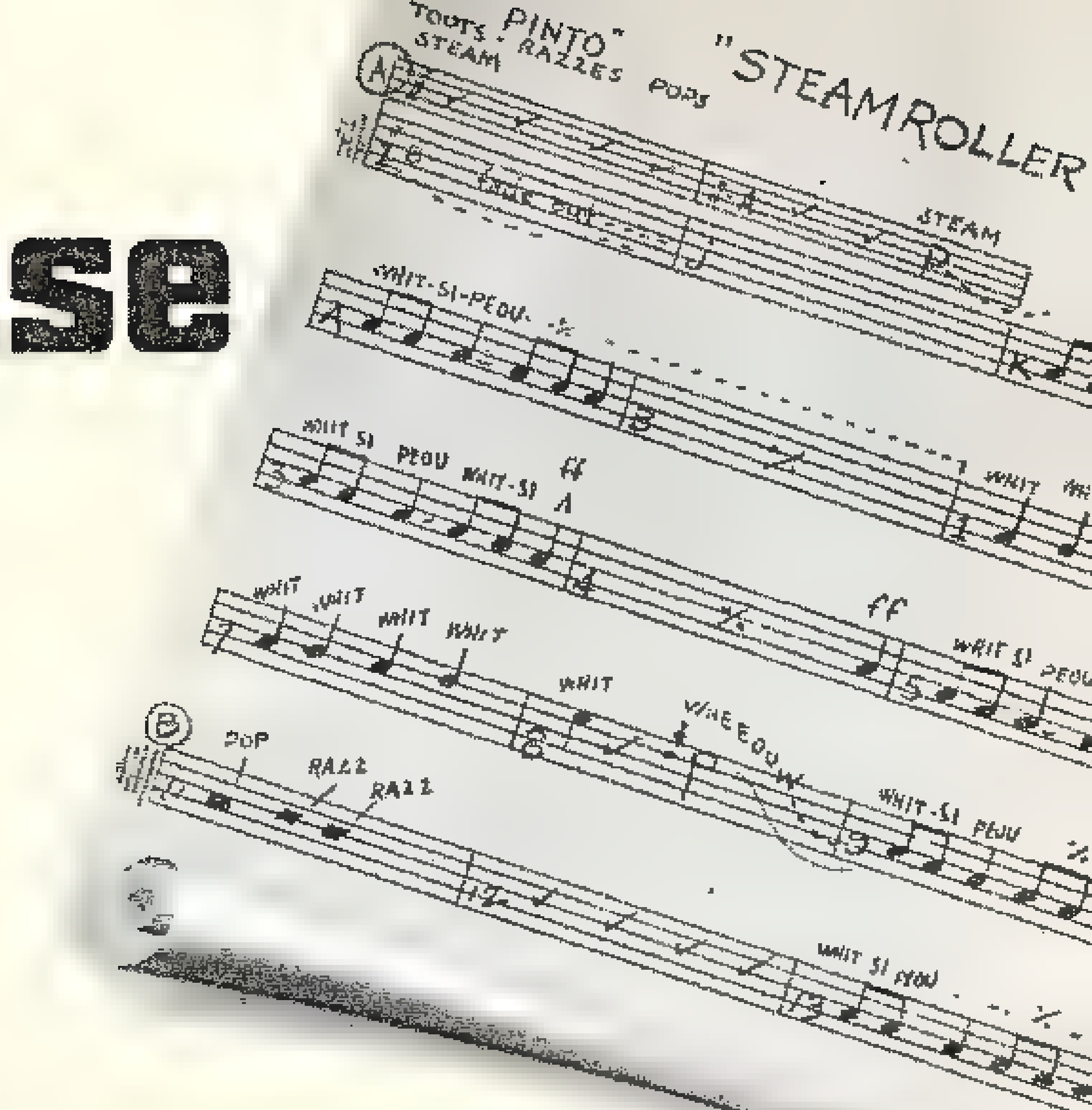
Through study and experimentation Walt Disney and his engineers have found that by introducing music or various sounds and noise frequencies into the cartoon, the response of the audience is varied and controlled. By combining noises of certain pitches or tempos the psychological values of the cartoon music is emphasized in keeping with the story requirements.

Sound of sixteen cycles is deep toned and may be used for conveying heavy or depressing moods, whereas the sound of a higher frequency is what William Garity, Chief Engineer at Walt Disney's, calls the "pain sensitive region." Noises of this higher pitch make the hearer alert and may be carried to the point of actually causing distress, such as a "file on glass" noise. The average ear is very sensitive to sounds of 2,000 or 3,000 cycles and unless some sound of this pitch is added to the cartoon background noise, the audience is less responsive to the effects.

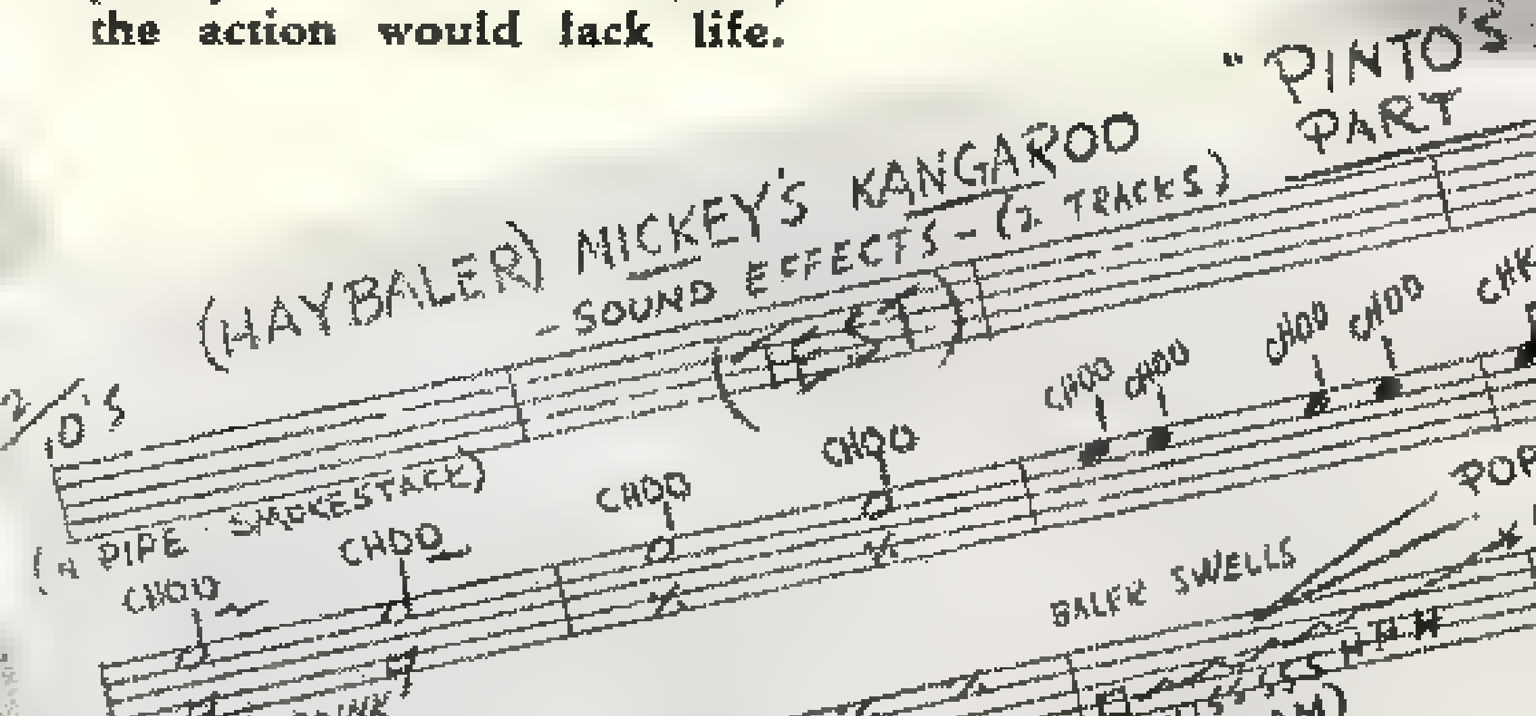
Stories are told by sound. "Pinto" Colvig, who wrote the lyrics for "The Three Little Pigs" and who does many of the sound "imitations" for automobiles, airplanes, or machines when they assume human characteristics, is able to convey a whole story by sound. For example, in a recent picture he caricatured a steam roller at work by suitable noises, pops, puffs, razzes, and wheezes. Vocally, without the aid of mechanical de-

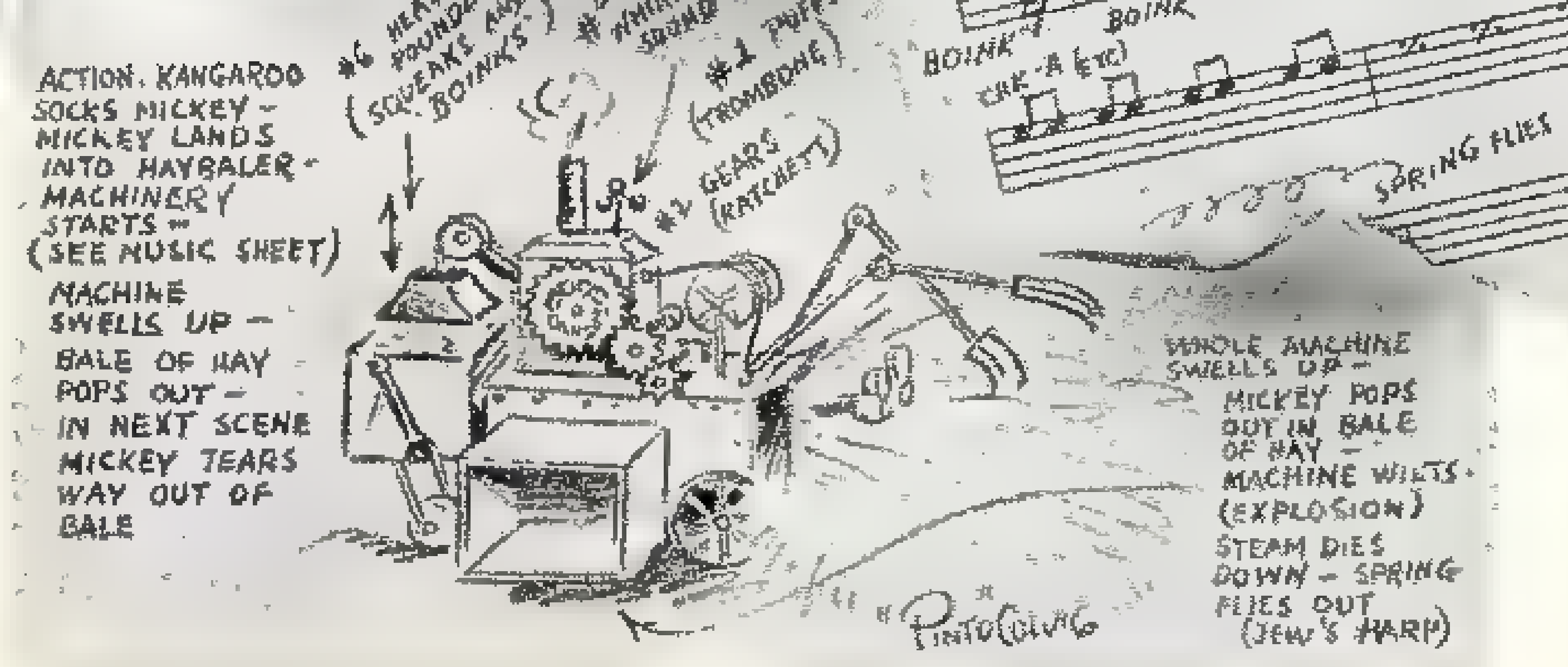
Copies of the "rough sketches" go to the cartoonists and musicians who build up the action and sound effects to the point illustrated. Above the results are being synchronized, and at right are some sound effect implements.

Walt Disney tempts a penguin into conversation with a strip of fish. Once the penguin begins to talk, his voice is recorded for movie cartoon use. This bird is heard in the film, *Peculiar Penguins*. All sorts of tricks are needed to persuade various animals to "talk."


"TOOTS, PINTO"
STEAM RAZZES POPS
"STEAMROLLER
STEAM
WHIT-SI-PEOU
WHIT SI PEOU WHIT-SI
WHIT WHIT WHIT WHIT
WHIT
WHEEOU
WHIT SI PEOU
WHIT-SI PEOU
POP
RAZZ
RAZZ
WHIT SI PEOU

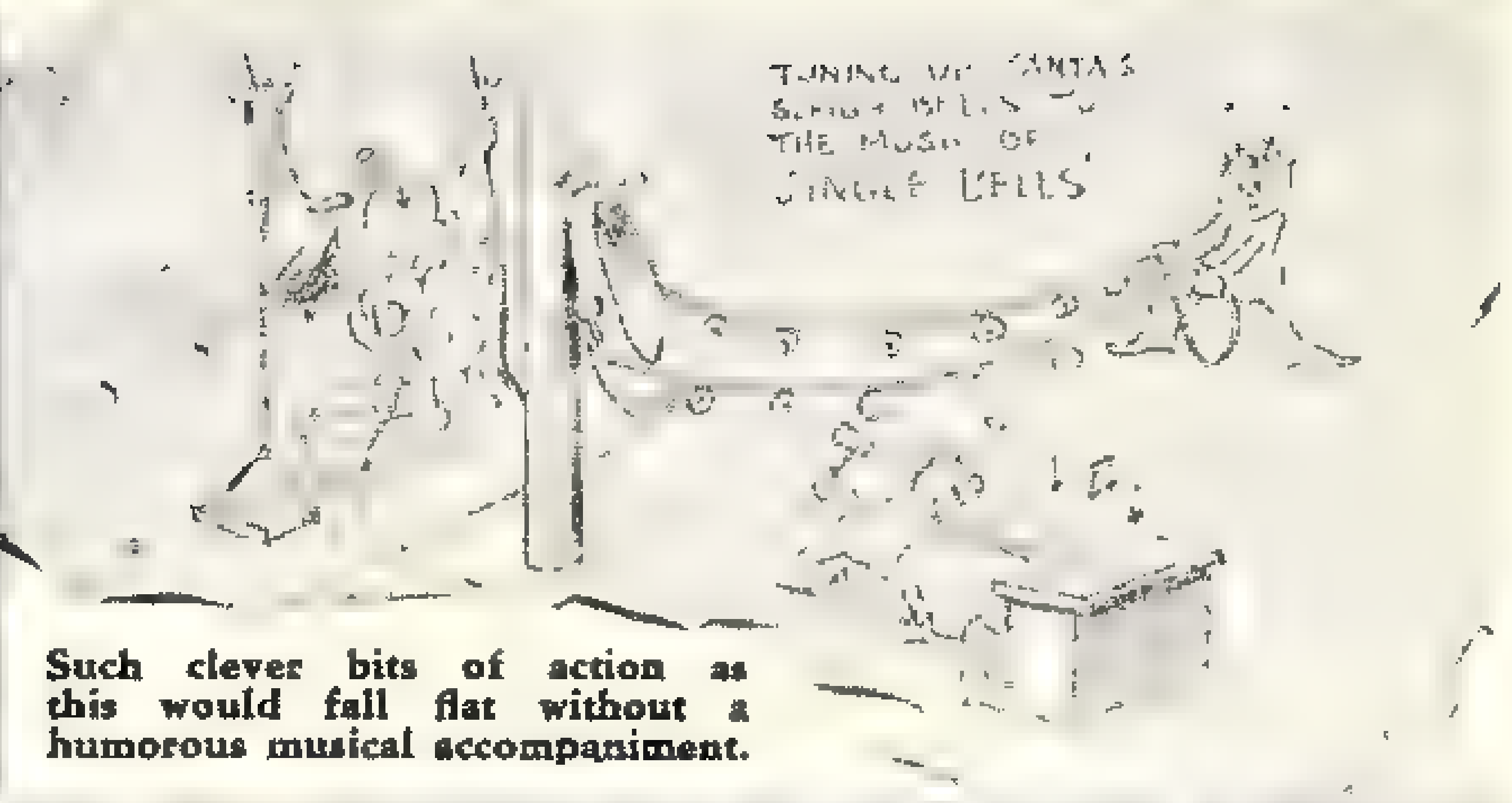
Part of the musician's score for a "steam roller symphony." Without music, the action would lack life.


"PINTO'S PART
(HAYBALER) MICKEY'S KANGAROO
- SOUND EFFECTS - (2 TRACKS)
(TEST)
2/10's
(4 PIPE SMOKESTACK)
CHOO
CHOO
CHOO
CHOO
CHOO CHOO
CHOO CHOO
BOINK
BOINK
CHK-A ETC
BALER SWELLS
POP
SWISSSSHHH (STEAM)
SPRING FLIES OUT


ACTION. KANGAROO SOCKS MICKEY - MICKEY LANDS INTO HAYBALER - MACHINERY STARTS - (SEE MUSIC SHEET)
MACHINE SWELLS UP -
BALE OF HAY POPS OUT -
IN NEXT SCENE MICKEY TEARS WAY OUT OF BALE
#6 HEAVY POUNDER (SQUEAKS AND BOINKS)
#5 WHIRRING SOUND
#1 PUFFS (TROMBONE)
#2 GEARS (RATCHET)
WHOLE MACHINE SWELLS UP -
MICKEY POPS OUT IN BALE OF HAY -
MACHINE WILTS - (EXPLOSION)
STEAM DIES DOWN - SPRING FLIES OUT (JEW'S HARP)
"PINTO" COLVIG

The "rough sketch" at left was given to "Pinto" Colvig for the musical interpretation. Each moving part was turned into sound as shown on finished score above.

A last minute conference before recording. Disney and his director talk it over with the conductor.


TUNING UP SANTA'S SLEIGH BELLS TO THE MUSIC OF 'JINGLE BELLS'

Such clever bits of action as this would fall flat without a humorous musical accompaniment.

The Silly Symphony orchestra on the special resonator floor which is used for special effects. Fifty or sixty hours of rehearsal are required in the production of the average film.

In the Monitor room the director, head engineer and Disney listen to the sounds produced on the sound stage. Here sound is reproduced exactly as it will be heard in the theater.

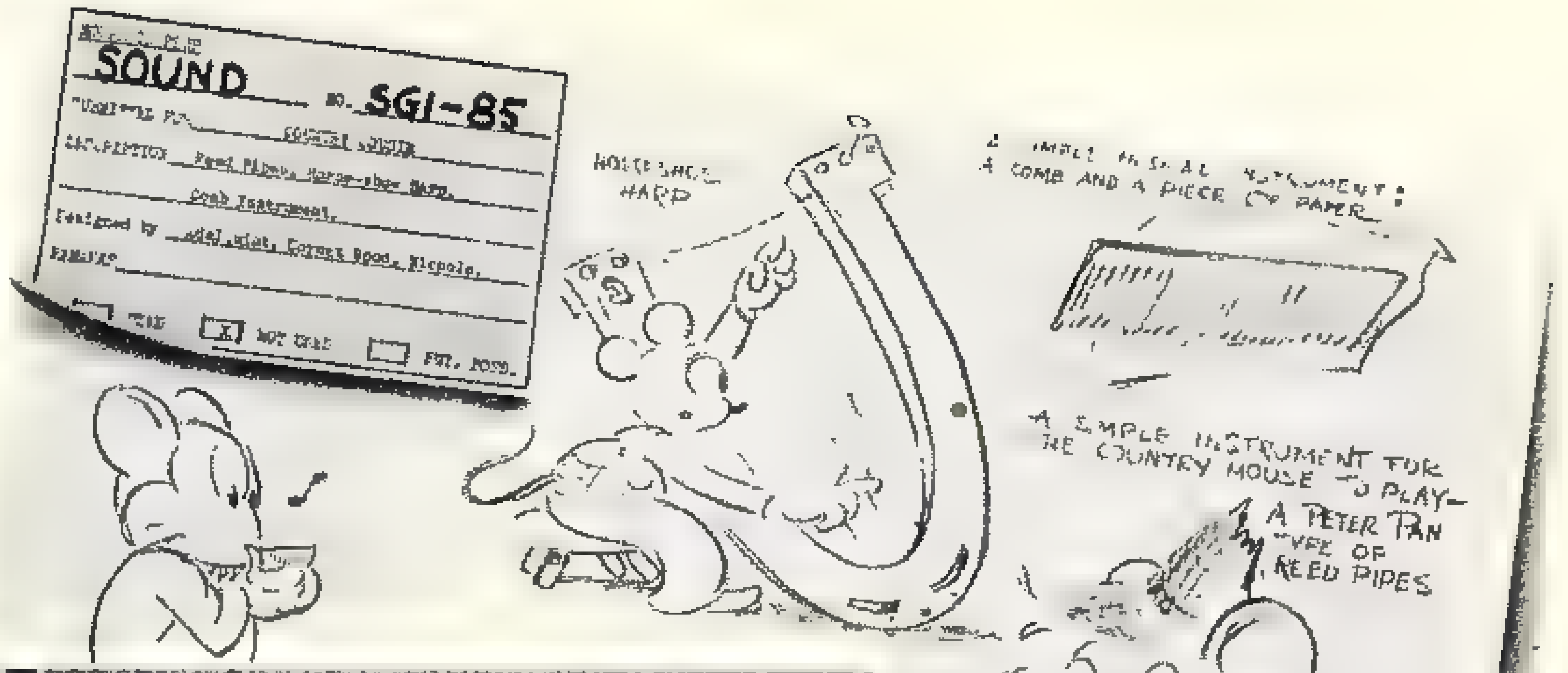
vices, he depicted a narrative episode of a very busy steam roller that worked hard, then got tired and stopped. To do this he made a picture on paper of the sound by working out the suitable suggestive sounds and inflections which he set down on music paper according to the desired effects, tonal range, and tempo which brought to life the pen and ink steam shovel. "Pinto" Colvig with the aid of a trombone and vocal sounds can make an airplane do all sorts of antics. Real airplane sounds cannot be controlled to musical tempo for cartoon effects.

Each sound in a cartoon film is the result of much thought. Such things as bugs, all sizes, getting the hiccoughs which happened in "Mickey's Garden" when Mickey sprayed them with "bug eliminator" required hours of rehearsal before the sound was recorded. For some sounds hours are required in rehearsal, and fifty or sixty hours are required to make the sound for the average cartoon.

There are six men and women under contract at Disney's who do nothing but mimic and imitate many sounds. The distorted Donald Duck conversation and singing is done entirely by mouth without mechanical aid, as is that of Madame Clara Cluck, Mickey, and the other characters. Walt, himself, does the Mickey chatter. Much of the "imitator's" time is spent in inventing cartoon noises.

For cartoon kisses, the "imitator" kisses his own hand or arm. For a Mickey-Minnie embrace, the "imitator" kisses the heel of his hand, while a tiny bug osculation is obtained from his thumb. A moist noisy smack is gained by kissing his arm at the elbow bend. Cartoon embraces are not as emotional as they are humorous because of the caricatured sound.

Each gag used in a Silly Symphony is selected from hundreds of others. The gag department contains thousands of inventions which will never be patented, for they operate only upon film for the amusement of theater patrons. Here are some ideas submitted for *The Country Cousin* but not used. They will be filed according to description on the card.


SOUND
No. SGI-85
HORSESHOE HARP
A SIMPLE MUSICAL INSTRUMENT: A COMB AND A PIECE OF PAPER
A SIMPLE INSTRUMENT FOR THE COUNTRY MOUSE TO PLAY— A PETER PAN TYPE OF REED PIPES

Here is a Silly Symphony in full swing, from the quartet at left and sound effects men at center to the orchestra at right. The panel at left "mixes" and blends the various sounds.

Recently a sound of a cartoon character talking under water was needed. After much experimentation, the sound was made by one of the "imitators" who talked while a common garden hose ran a stream of water into his mouth.

While much of the sound is made vocally, mechanical devices and various materials are also used. One kind of slow-burning fire noise is made by crinkling cellophane, while a more crackling fire sound is gained by twisting a bundle of bamboo strips. A train getting under way is obtained by a tin can in which is a handful of gravel. By shaking the can and gravel up and down, the noise of a real railroad train is created. Another "train noise maker" consists of a number of wires held at one end by hand. The other end of the wires is rubbed over a sheet of corrugated tin. Thunder claps of various kinds are obtained by cowhides and sheets of metal, while wind noises are made by rapidly revolving a wheel with wire spokes. Another hollow ghostly wind noise is made by revolving a wooden drum against taut silk. Rain noises are made in a drum in which are stretched piano wires. Particles of glass dropping against the wire when the drum is revolved creates the sound.

Now that music is carrying a big part of the action, the cartoon animator times his action to so many drawings per beat of music. The number varies according to the musical time.

Lion roars are obtained from a barrel over which is stretched, drumlike, a piece of skin. Into the center of this skin is tied a heavy piece of cat-gut and the sound is made by sliding a rosin coated piece of leather down the cat-gut. Dog barks are made by similar though smaller contraptions. Various dog bark pitches are made by using assorted sizes of tin cans. The dog "language" is produced by the manner in which the rosined leather is slid on the string. Often ordinary tools such as egg beaters which furnish machinery noise, derby hats which supply thumping or more exactly a "plop in" sound, and so forth are used for suitable noises.

FANCY SKATING

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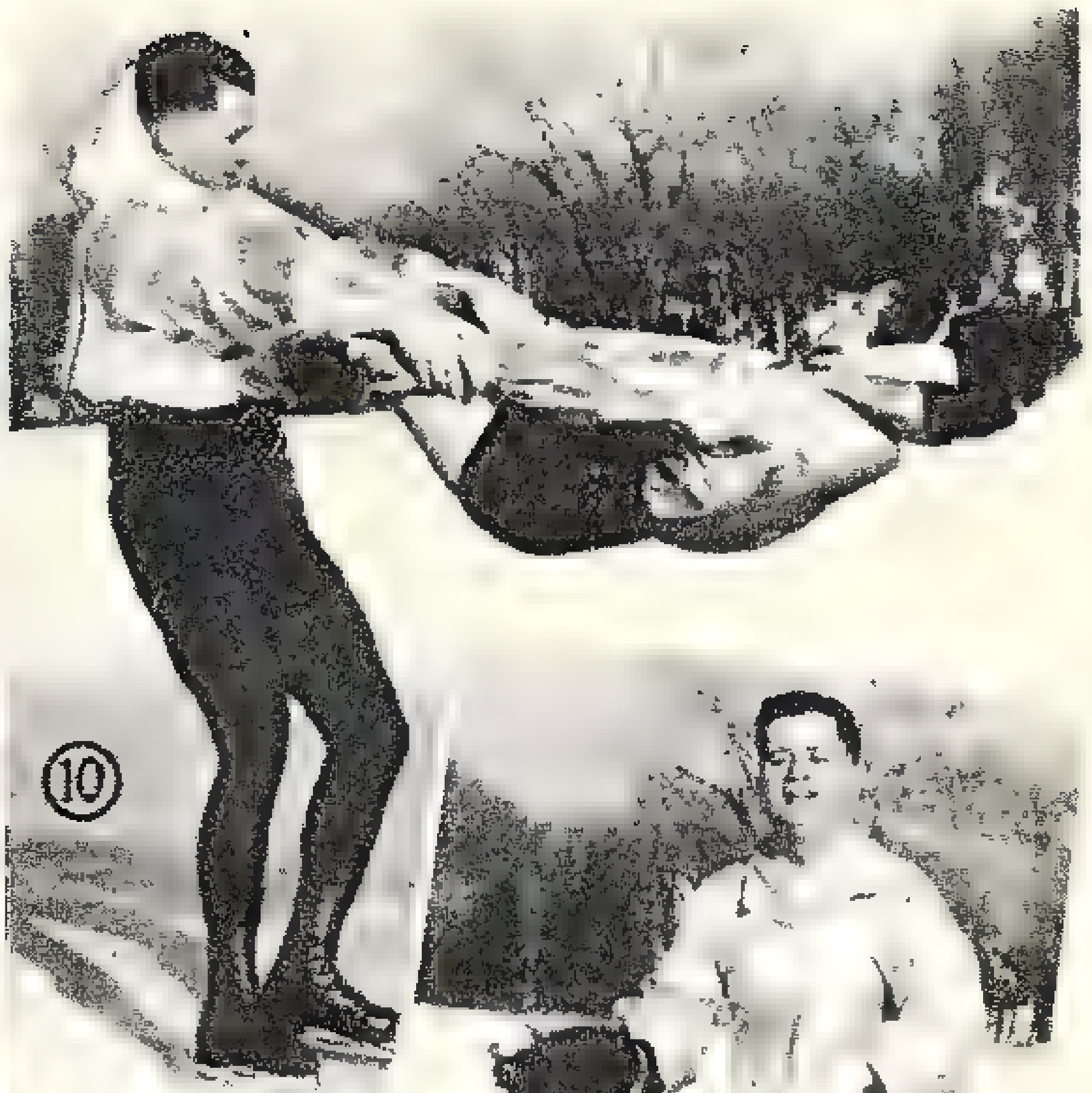
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The skill and grace of star ice skating performers is graphically shown in this series of action photographs taken by George Ryan, Minneapolis (Minn.) *Tribune* cameraman. The photos, taken by a super-speed camera, show Norris and Naome Wold going through the evolutions of the "puck spin" at Lake Of The Isles in Minneapolis. Fancy skating calls for a degree of skill and precision second to that of few other activities. Speed, balance, strength, endurance—all are required of those who would perform on the flashing blades. A slip here, a moment's hesitation there, and what started as a graceful exhibition is turned into an awkward, stumbling display. Constant, painstaking practice is necessary.

TACKLE For Salt Water FISHING

by
Robert Page Lincoln

UNLESS you are familiar with sea fishing the selection of the proper tackle is open to conjecture. There are so many sea fish, all of which fall into many and various divisions such as large, medium and small, some mad tearing and others just a little bit better than very active. All of these species have to be taken into consideration when selecting sea-fishing tackle.

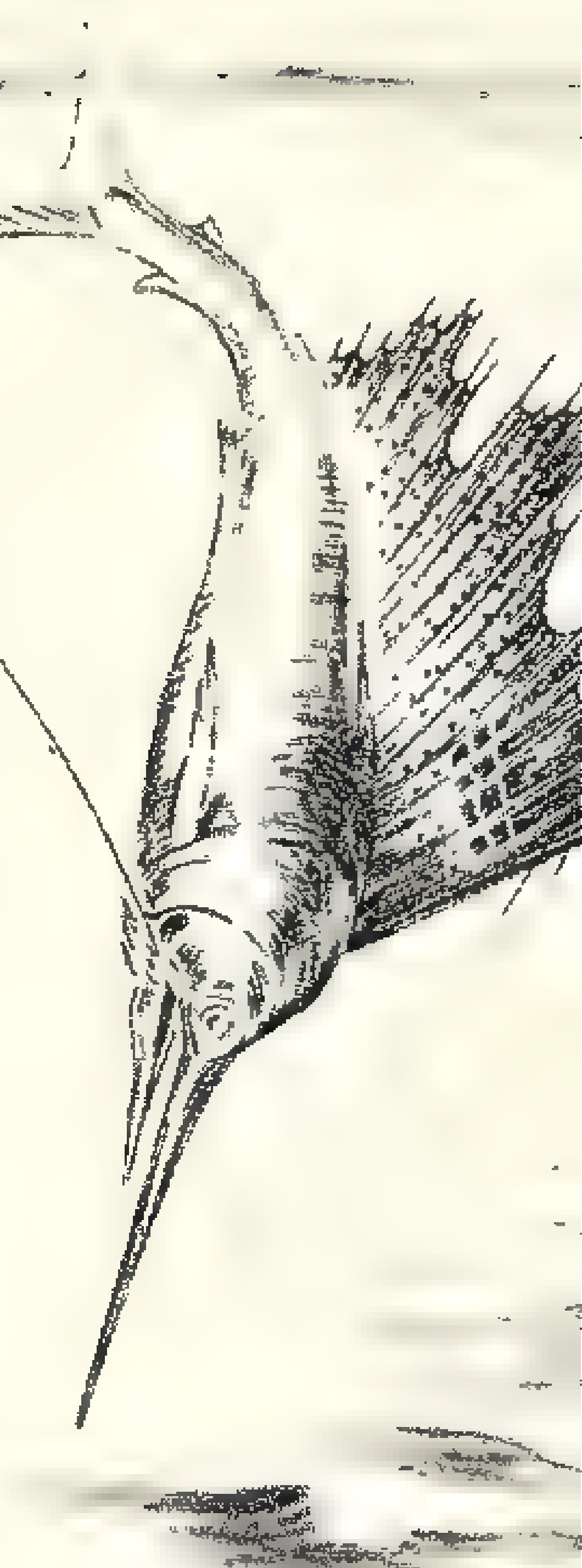
Needless to state the tackle to be used for sea fishing must be picked according to the size of the fish one is after. Obviously the very large fish, such as the marlin swordfish, the sailfish, the tarpon and the tuna (all racy fish of tackle-testing proportions and activity) demands the stoutest and most enduring tackle. For such fish a double enamel tip of 60 inches and a weight of approximately 14 to 16 ounces is a suggestion. The butt length will be 20 inches, or the rod, with butt in place, measuring 6 feet 8 inches over all. With a rod of the sort a 9-0 reel or heavier is a suggestion. A 36 to 38-thread cuttyhunk line is often used although lighter lines are selected by those practiced in the use of medium weight tackle.

Medium weight tackle is used in the taking of such fish as the barracuda, the amberjack, the great kingfish, California yellowtail, crevalle and others. *The rods for this* purpose should range from 10 to 14 ounces, with a 6-0 reel to keep it company. A 24 to 30-thread cuttyhunk line is a practical suggestion. A double enamel rod is not needed for this department, the single enamel rod being suitable and not too light. A tip in this class weighing 9 ounces has a length of 60 inches.

A lighter rod, one ranging 7 to 10 ounces in weight will take a 4-0 reel, with a cuttyhunk linen line of from 15 to 21 threads. A rod of the sort will handle with ease all fish less in weight than the species listed in the second class. Incidentally, let it be mentioned that in this third class of sea fish, in which will be found the mangrove snappers, the Spanish mackerel, the bluefish, the sea trout, the channel bass, the smaller croakers, the robalo, the sheepshead, and others, the common, everyday bait rod and black bass fishing tackle such as is used in inland fishing is now much in vogue. In fact, there is an ever-increasing disposition on the part of anglers to invade even the ranks of the class

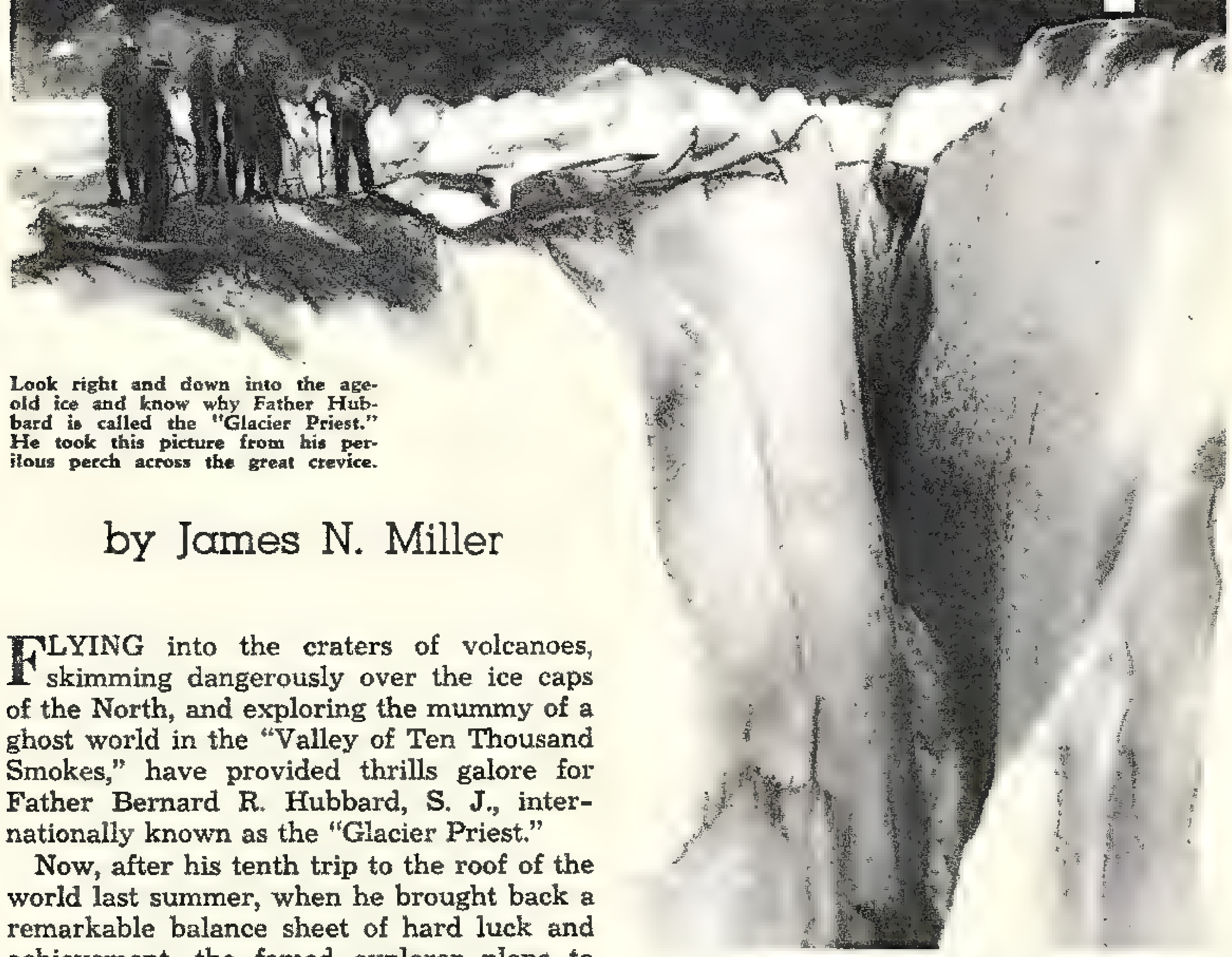
Whe-e-e-e-e-e! sings the reel in the song of the strike. Out behind the boat is a warrior in a writhing, silvery dance—a cyclone on a leash!

Circle—Hooking a tarpon is synonymous to roping a wild mustang. When the strike occurs, the great fish leaps high out of the sea in efforts to shake off the hook, then the fight is on. Below—A sextette of big ones soon to become swordfish fillets. In Southern California waters, where these pictures were taken, monster, man-eating sharks often bite chunks from the fish before it can be hauled aboard the boat.



Sometimes a young hammerhead shark gobbles up the bait, as shown above. To cut the hook from the mouth of this detestable fish often results in a skinned arm or hand, for sharks have sandpaper skin. Below—A proud man poses with a 200-pound marlin swordfish which he caught in the Gulf of Mexico.

GLACIER PRIEST Maps ROOF of the WORLD



Look right and down into the age-old ice and know why Father Hubbard is called the "Glacier Priest." He took this picture from his perilous perch across the great crevice.

by James N. Miller

Soaring over craters, jumping bottomless pits edged with rotten ice, frozen by gales, feet frying in volcanic heat—these are experiences of Father B. Hubbard.

Magook, Father Hubbard and Wolfe—the three pals who fought the dangers of six Alaskan expeditions together. And last summer, when a mother huskie gave birth to seven woolly pups, Magook and Wolfe toted the babies in addition to their 50 lb. packs.

Off Bogsolof, Father Hubbard attempted to make a 4-ton sea lion into a movie actor, but was rebuked with angry barks and a lumbering chase that threatened to crush the nearby cameras and scientific apparatus. A full-grown sea lion is no man's friend.

FLYING into the craters of volcanoes, skimming dangerously over the ice caps of the North, and exploring the mummy of a ghost world in the "Valley of Ten Thousand Smokes," have provided thrills galore for Father Bernard R. Hubbard, S. J., internationally known as the "Glacier Priest."

Now, after his tenth trip to the roof of the world last summer, when he brought back a remarkable balance sheet of hard luck and achievement, the famed explorer plans to turn from the study of geology—the science of rocks—to the study of primitive human beings.

For, while pondering the mysteries of the birth of storms that influence the four seasons of the year in the United States for better or for worse, Father Hubbard believes he has also fathomed the origin of man in America, who came to this continent on a newly discovered ancient road from Asia.

Father Hubbard believes that his last trip, the tenth in a successive series, was the most important of all. He found that the Taku ice-cap, near Juneau, one of the southernmost formations of its kind, is receding and exposing a fossil glacier of the last Ice Age. Nearby, he said, the Taku glacier was half aground and will soon cease breaking off icebergs, and Twin glacier has receded a mile and is wholly aground. This means the tremendous flow of icebergs that consitutes an ever-present menace to shipping hundreds of miles to the south, soon will be a hazard of the past.

Does this rock writing mark the road by which ancient man first came into America from Asia? Father Hubbard (above) believes so, claiming many came in over this chain of Aleutian Islands, although the main route was by the Bering Sea.

Viewing the immense Taku ice-cap last summer for the first time in ten years, the Glacier Priest reported:

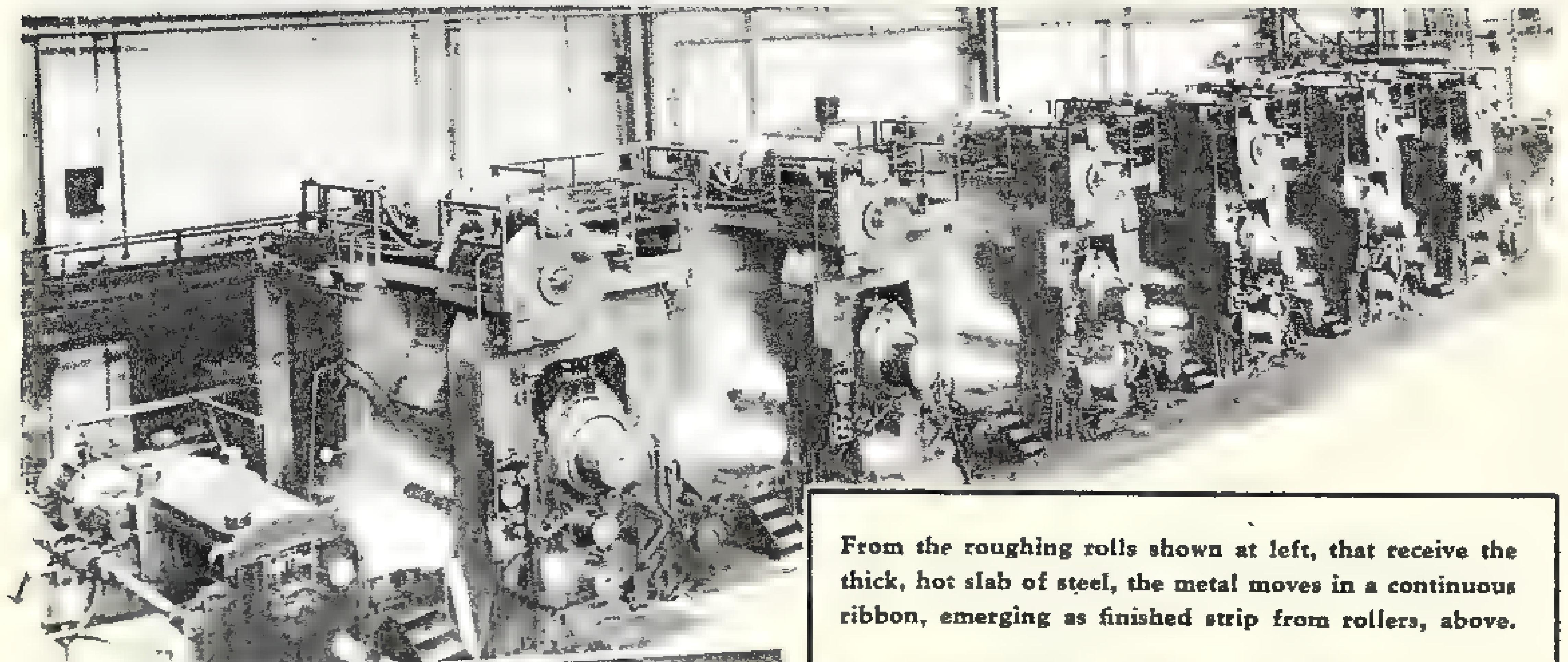
"The vast ice mass is shrinking, which proves that the earth is still in a recessional ice age. On Taku ice-cap many new mountains, called Nuntakas, as well as long, rocky ridges have appeared where I saw only crevassed ice ten years ago, Taku glacier and the lobes of Twin glacier have retreated. The Mendenhall glacier has been melting back and is exposing a fossil glacier underneath the present one. The hundreds of square miles of this ice-cap and its many glacier tongues are a new layer of ice hundreds of feet thick lying on top of a remnant of the last ice age, which is a fossil body of ice entirely different in crystal form. It appears here and there as the upper layer melts."

Father Hubbard and his party found landlocked icebergs in Twin glacier lake, the bottom of which is 600 feet below sea level. The icebergs float there the year round, and keep the water near freezing temperatures.

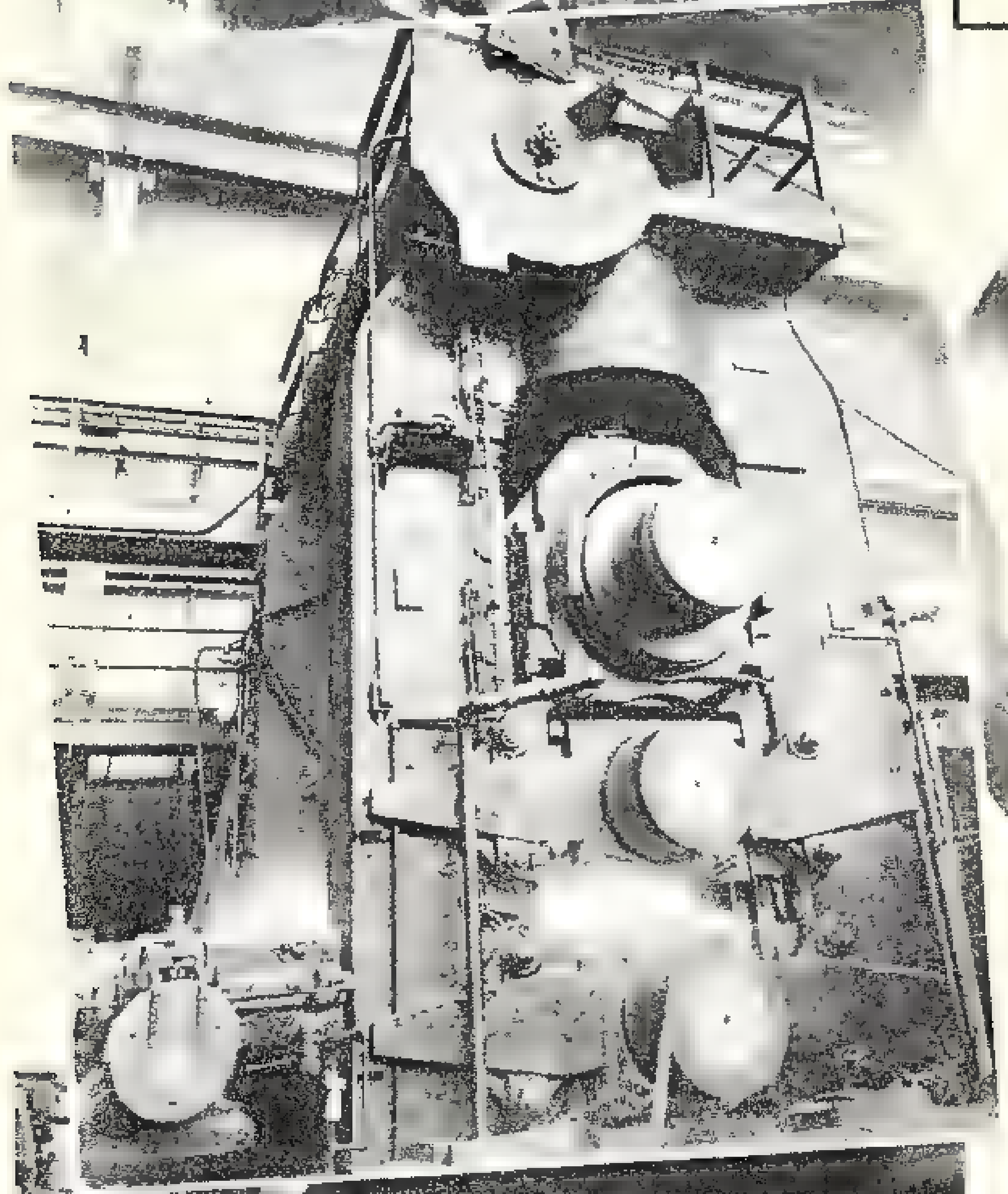
Nicholas Cavalierre, of New Haven, Conn., a member of the Hubbard party, took 50,000 feet of motion pictures of the Taku region. The year before, on the ninth expedition, the party also took 30,000 feet of film of action "shots" of glaciers of a spectacular type never before filmed—showing enormous mountains of ice tearing away from the glacier mother to strike the sea below with a terrific roar and splash. These "shots" were made on the final 60-mile lap of exploration of the entire 600 miles of the Alaskan Peninsula and adjacent islands, and were taken from a small steamer anchored alongside Hubbard glacier in Disenchantment bay, southeastern Alaska.

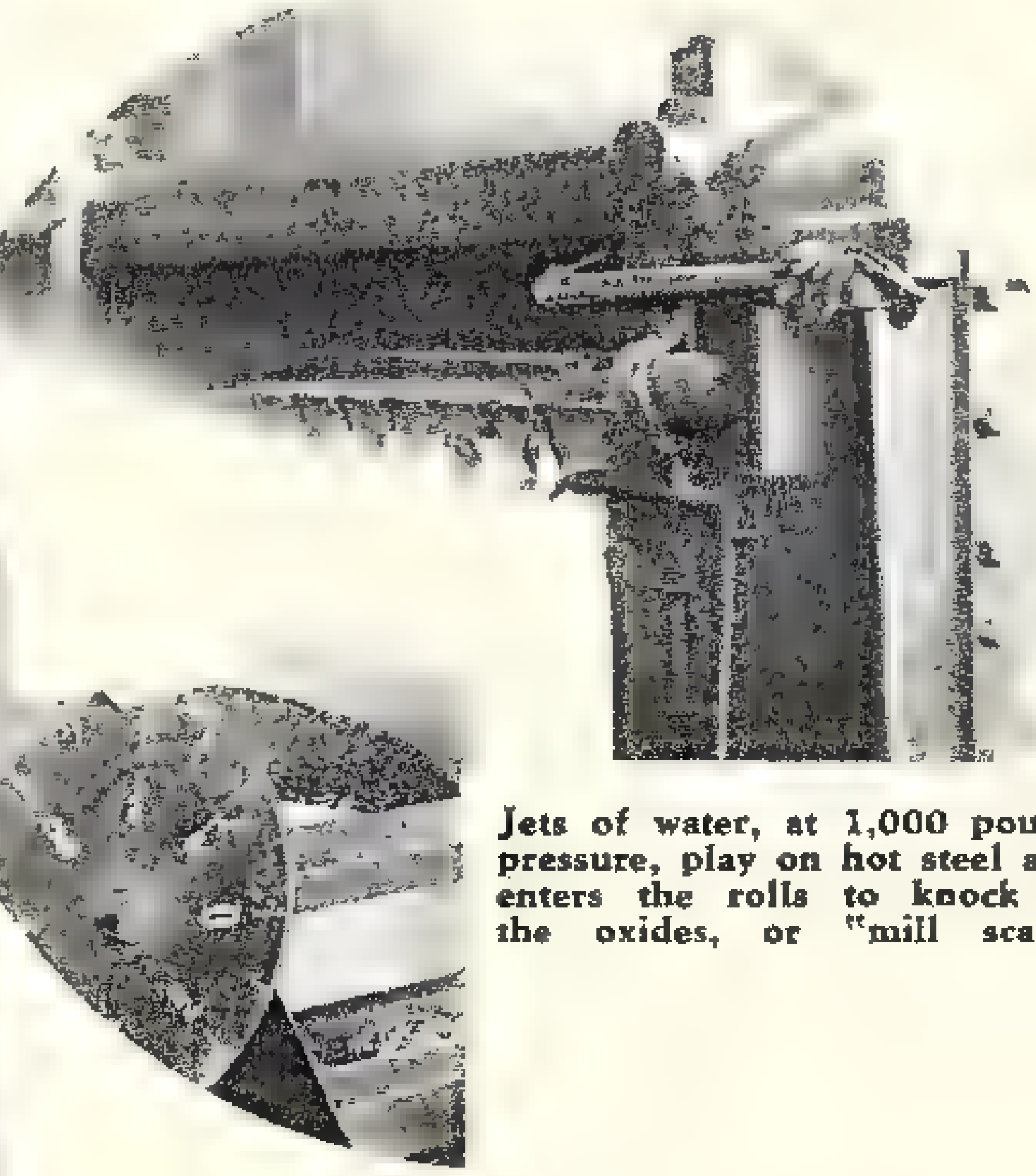
[*Continued on page 128*]

BETHLEHEM Opens New $20,000,000 MILL



From the roughing rolls shown at left, that receive the thick, hot slab of steel, the metal moves in a continuous ribbon, emerging as finished strip from rollers, above.





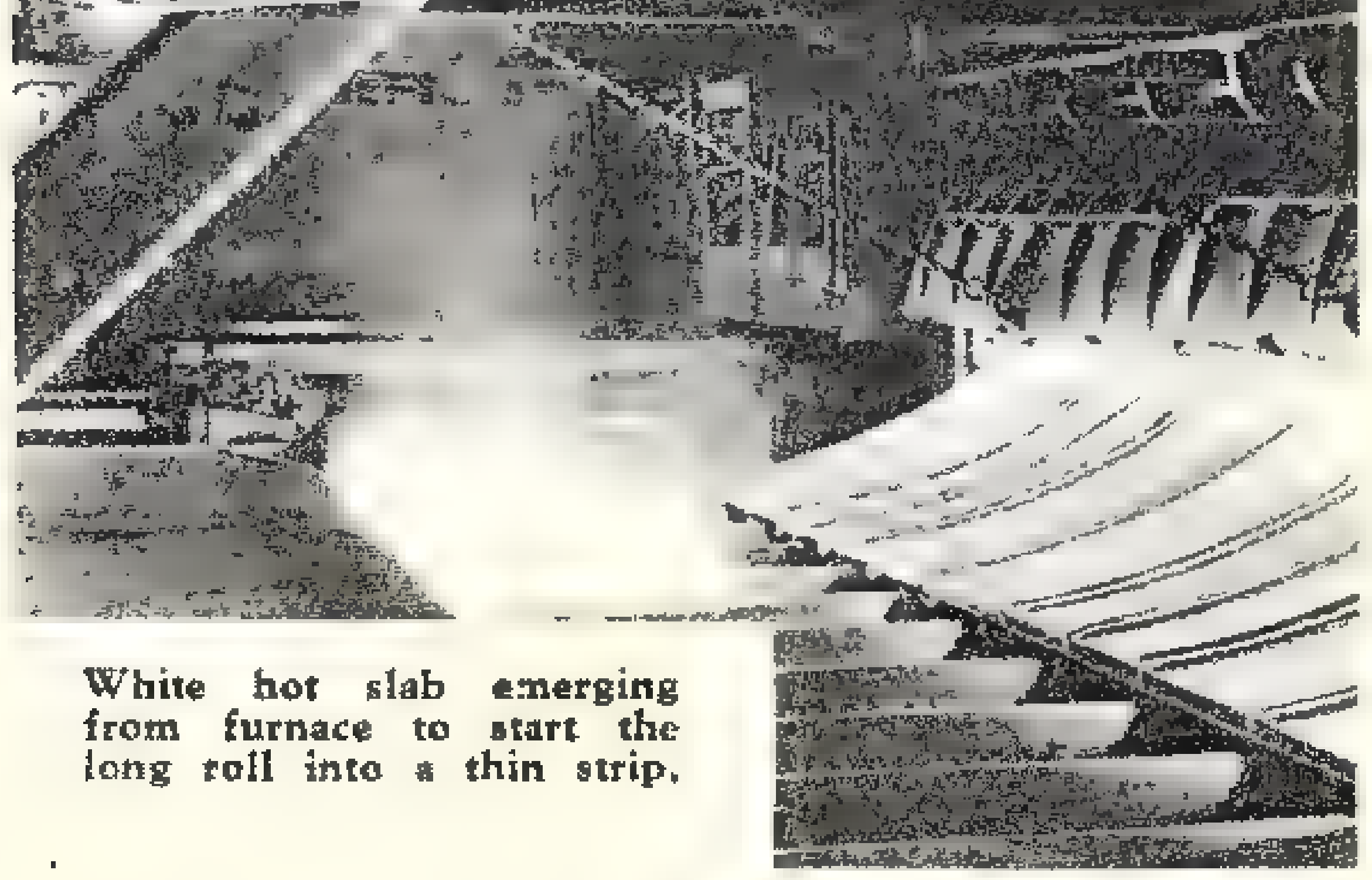
Jets of water, at 1,000 pounds pressure, play on hot steel as it enters the rolls to knock off the oxides, or "mill scale."

by Watson Davis

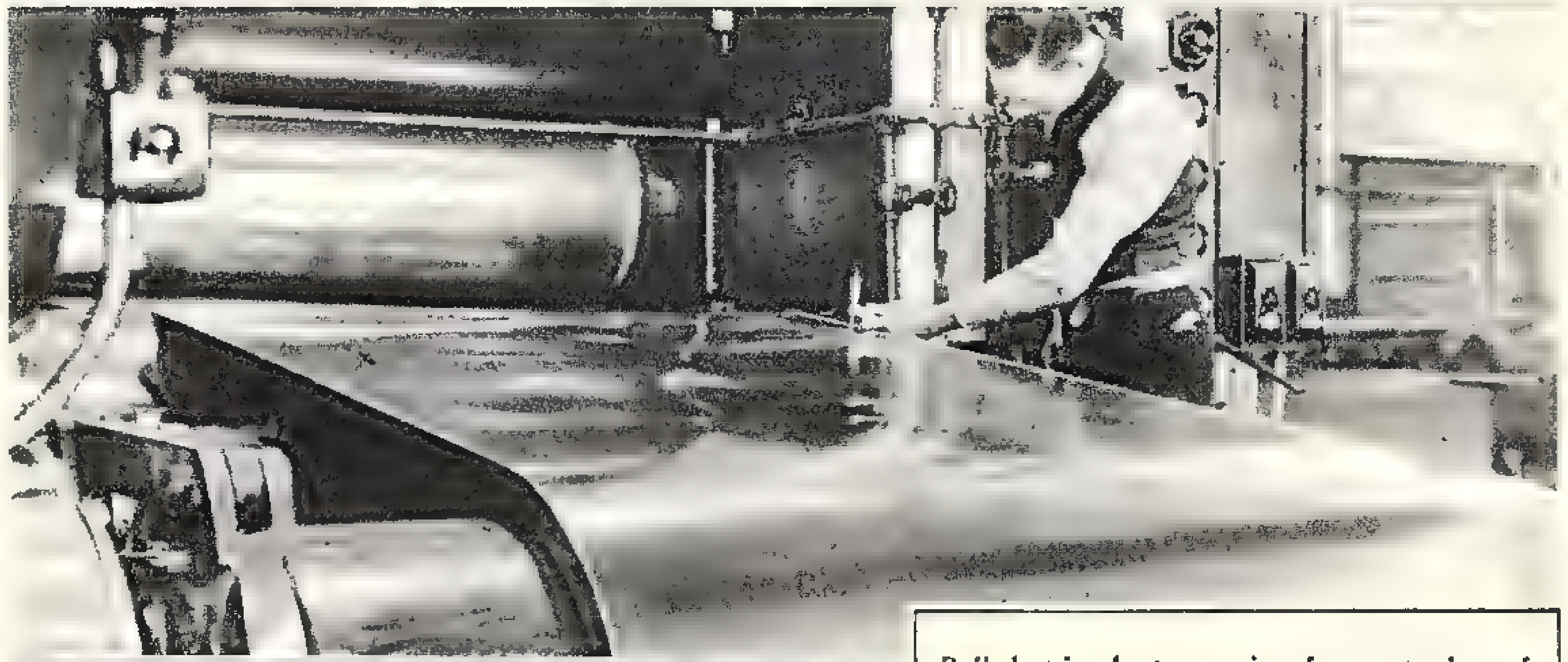
MAN and machine reach new heights of co-ordination in a new $20,000,000 steel strip mill of the Bethlehem Steel Co., at Lackawanna, N. Y., near Buffalo. Human brains and skill, both in design and operation, combine with precise and delicate control of large electrical power to roll a thick slab into a lengthy strip of sheet metal in a few minutes.

To see a red-hot chunk of steel pass successively through eleven huge sets

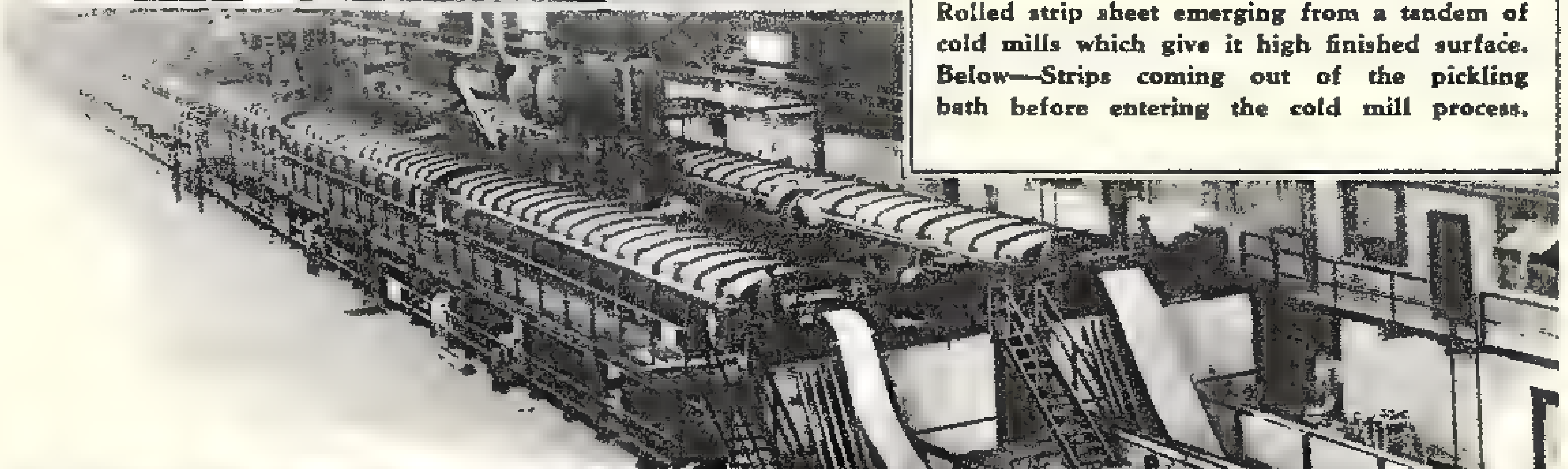
[*Continued on page* 128]



White hot slab emerging from furnace to start the long roll into a thin strip.



Rolled strip sheet emerging from a tandem of cold mills which give it high finished surface. Below—Strips coming out of the pickling bath before entering the cold mill process.



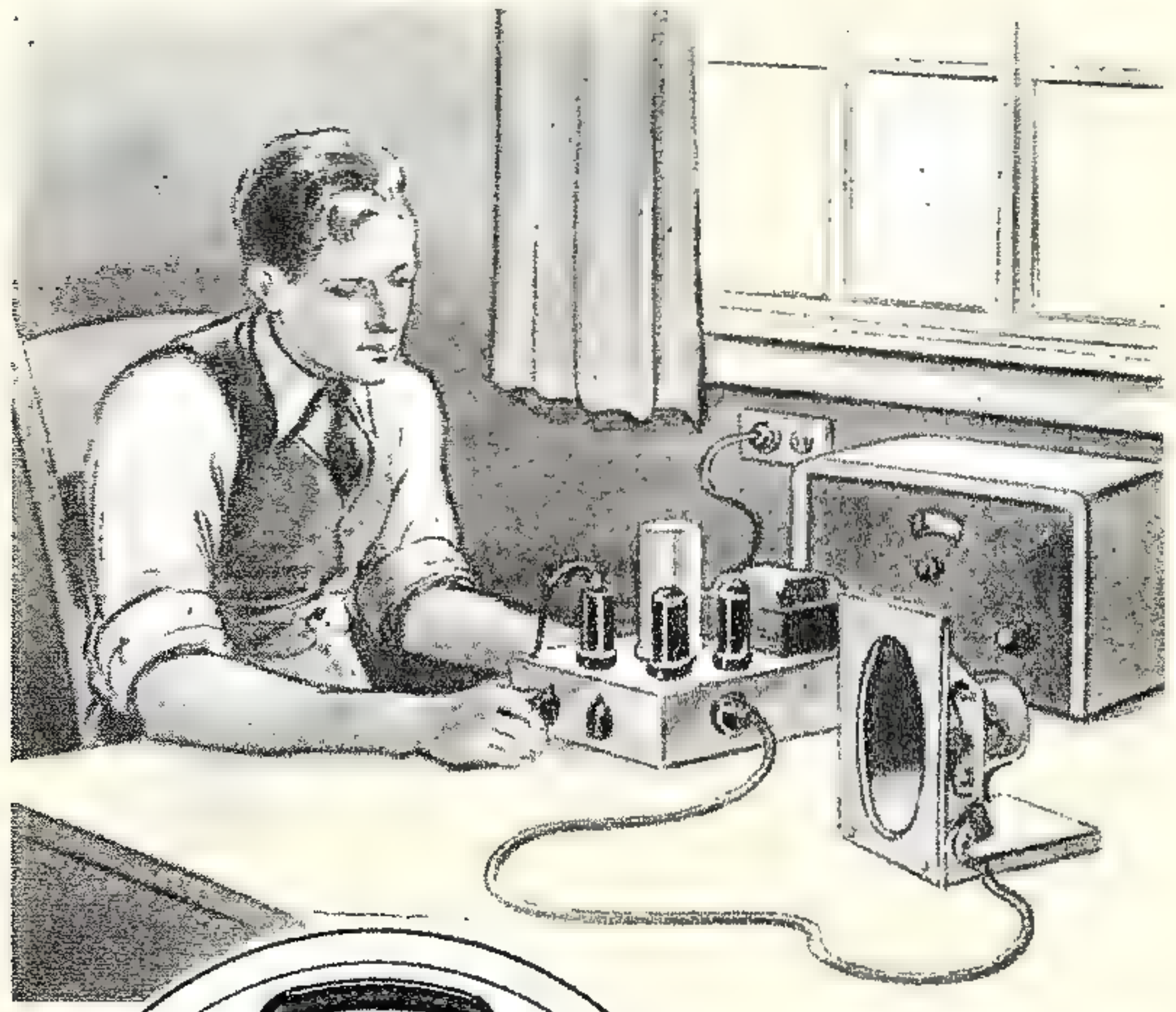
The finished product ready for cold-forming into auto bodies and hundred-and-one other products. It is shipped in flat sheets, as at left, and in coils weighing tons each.

TINY AMPLIFIER FEATURES METAL TUBES

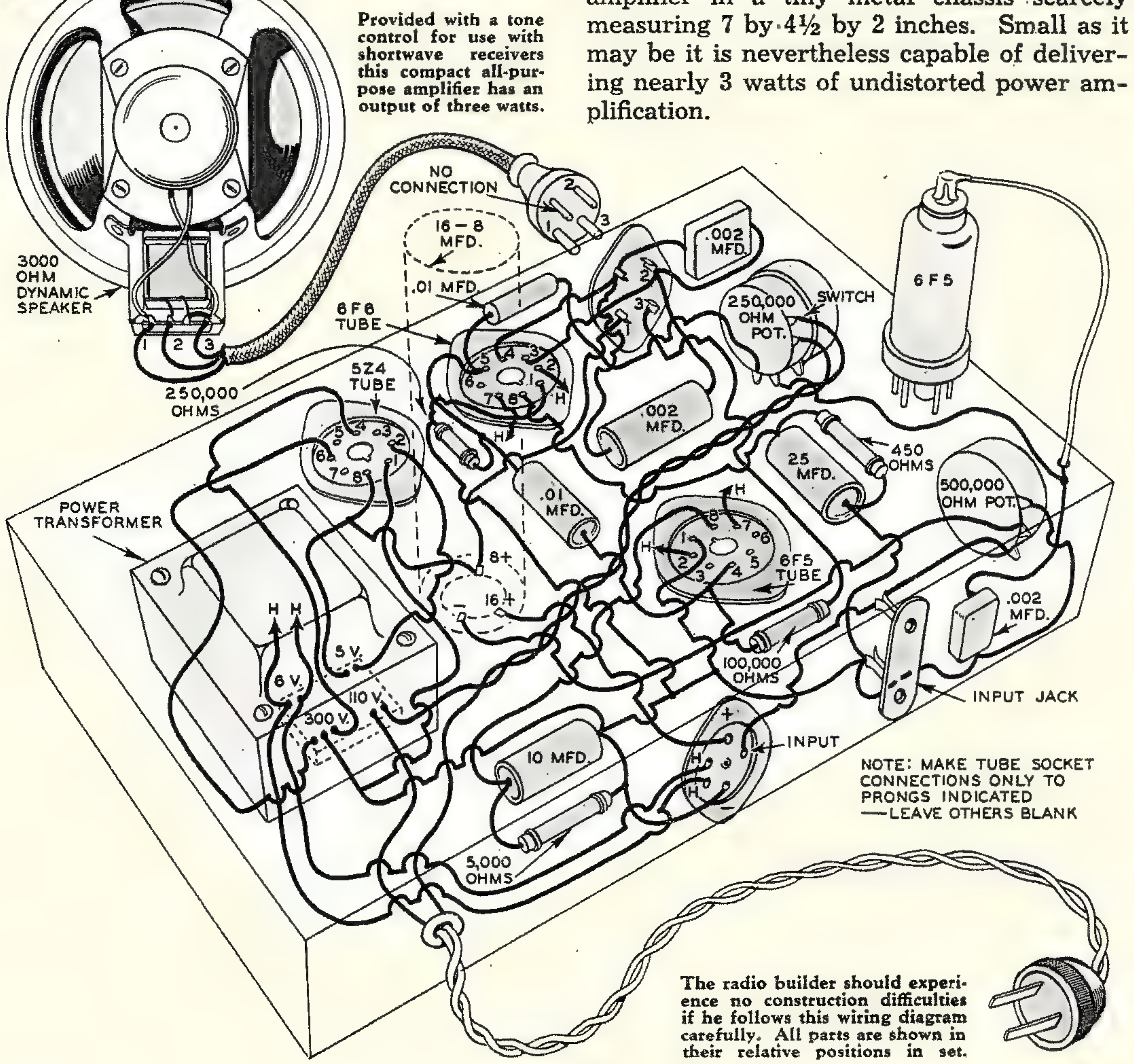
by Wm. J. Vette

This compact metal tube amplifier provides both B power and speaker volume for small sets.

EVERY radio experimenter has occasion at some time to use an amplifier; especially if he owns a small two or three-tube short wave receiver. Until a few years ago any amplifier that had the least bit of output was a bulky affair weighing at least 25 pounds. With the improvements in radio design which have been made during the last few years it is now possible to construct a powerful little amplifier in a tiny metal chassis scarcely measuring 7 by 4½ by 2 inches. Small as it may be it is nevertheless capable of delivering nearly 3 watts of undistorted power amplification.



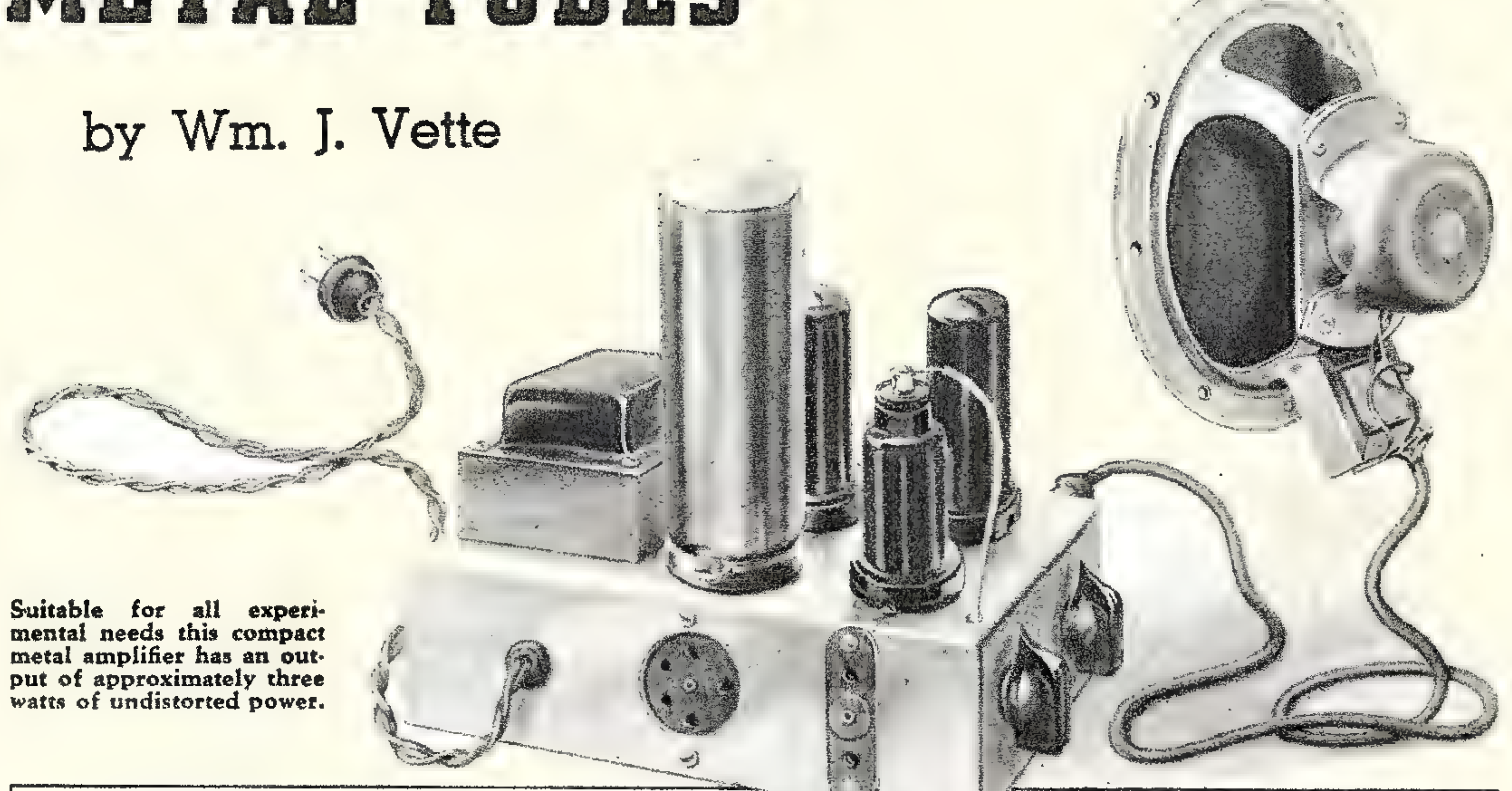
Provided with a tone control for use with shortwave receivers this compact all-purpose amplifier has an output of three watts.



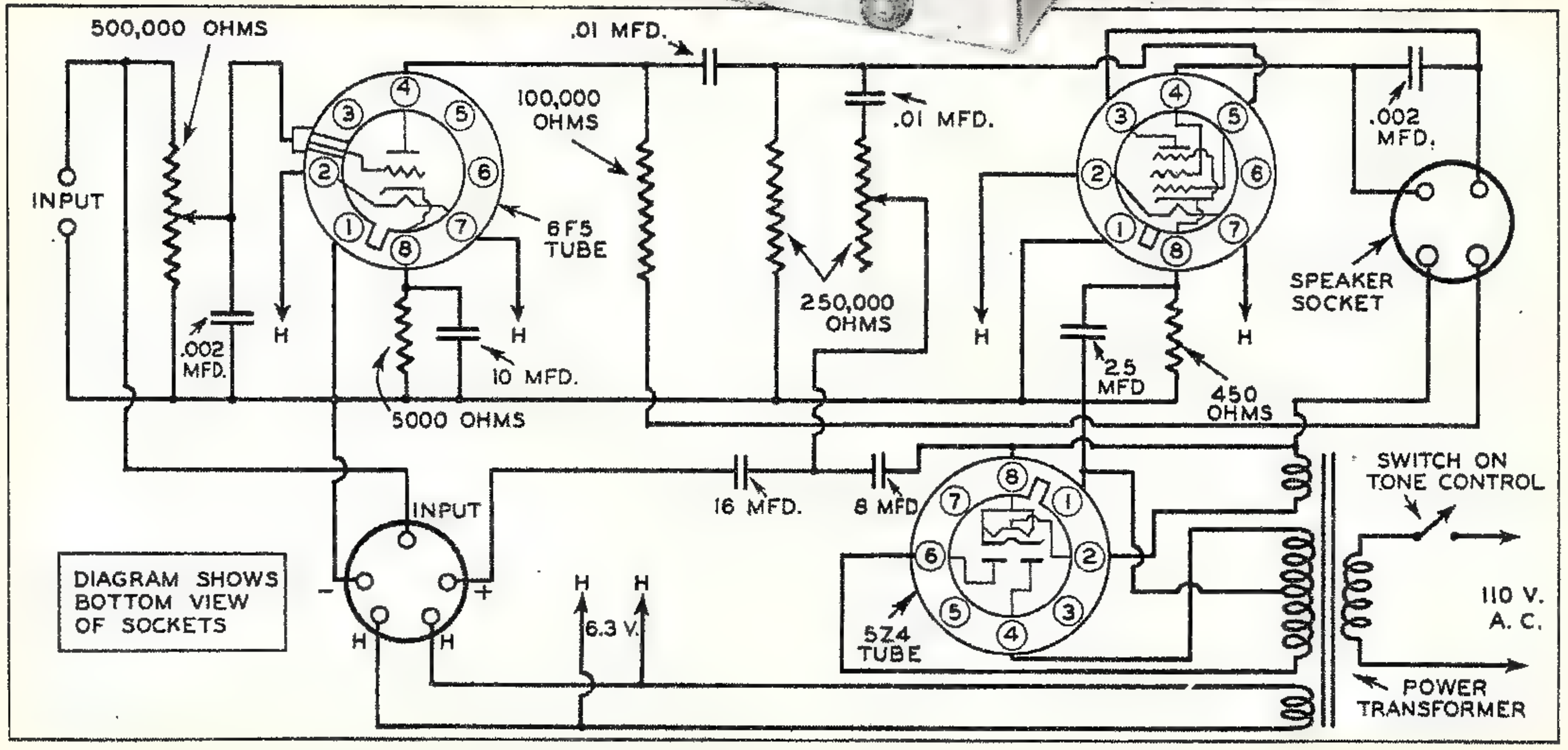
3000 OHM DYNAMIC SPEAKER
NO CONNECTION
2
3
16-8 MFD.
.01 MFD.
.002 MFD.
250,000 OHM POT.
SWITCH
6F5
6F6 TUBE
5Z4 TUBE
250,000 OHMS
.002 MFD.
25 MFD.
450 OHMS
500,000 OHM POT.
.01 MFD.
6F5 TUBE
POWER TRANSFORMER
H H
6 V.
5 V.
110 V.
300 V.
8+
16+
100,000 OHMS
.002 MFD.
INPUT JACK
10 MFD.
INPUT
5,000 OHMS

NOTE: MAKE TUBE SOCKET CONNECTIONS ONLY TO PRONGS INDICATED —LEAVE OTHERS BLANK

The radio builder should experience no construction difficulties if he follows this wiring diagram carefully. All parts are shown in their relative positions in set.



Suitable for all experimental needs this compact metal amplifier has an output of approximately three watts of undistorted power.



500,000 OHMS
.01 MFD.
100,000 OHMS
.01 MFD.
.002 MFD.
INPUT
6F5 TUBE
.002 MFD.
H
10 MFD.
5000 OHMS
250,000 OHMS
H
25 MFD
450 OHMS
H
SPEAKER SOCKET
SWITCH ON TONE CONTROL
INPUT
16 MFD.
8 MFD
DIAGRAM SHOWS BOTTOM VIEW OF SOCKETS
H H
6.3 V.
5Z4 TUBE
110 V. A. C.
POWER TRANSFORMER

If this schematic wiring diagram is followed along with the pictorial hook-up there is little chance for errors to occur. Note that the tube prongs are not all connected in the circuit since some are blank. Tube sockets, above, show the connections as they appear from the bottom of socket; pictorial diagram shows top view.

The construction is begun by forming the chassis from a sheet of alloy metal or aluminum. Of course, sheet iron may be used but it is more difficult to handle. After punching out the holes for the tube sockets, assemble the sockets and proceed to wire up the various parts. Work can be simplified if the pictorial and schematic diagrams are carefully studied before any actual construction is started.

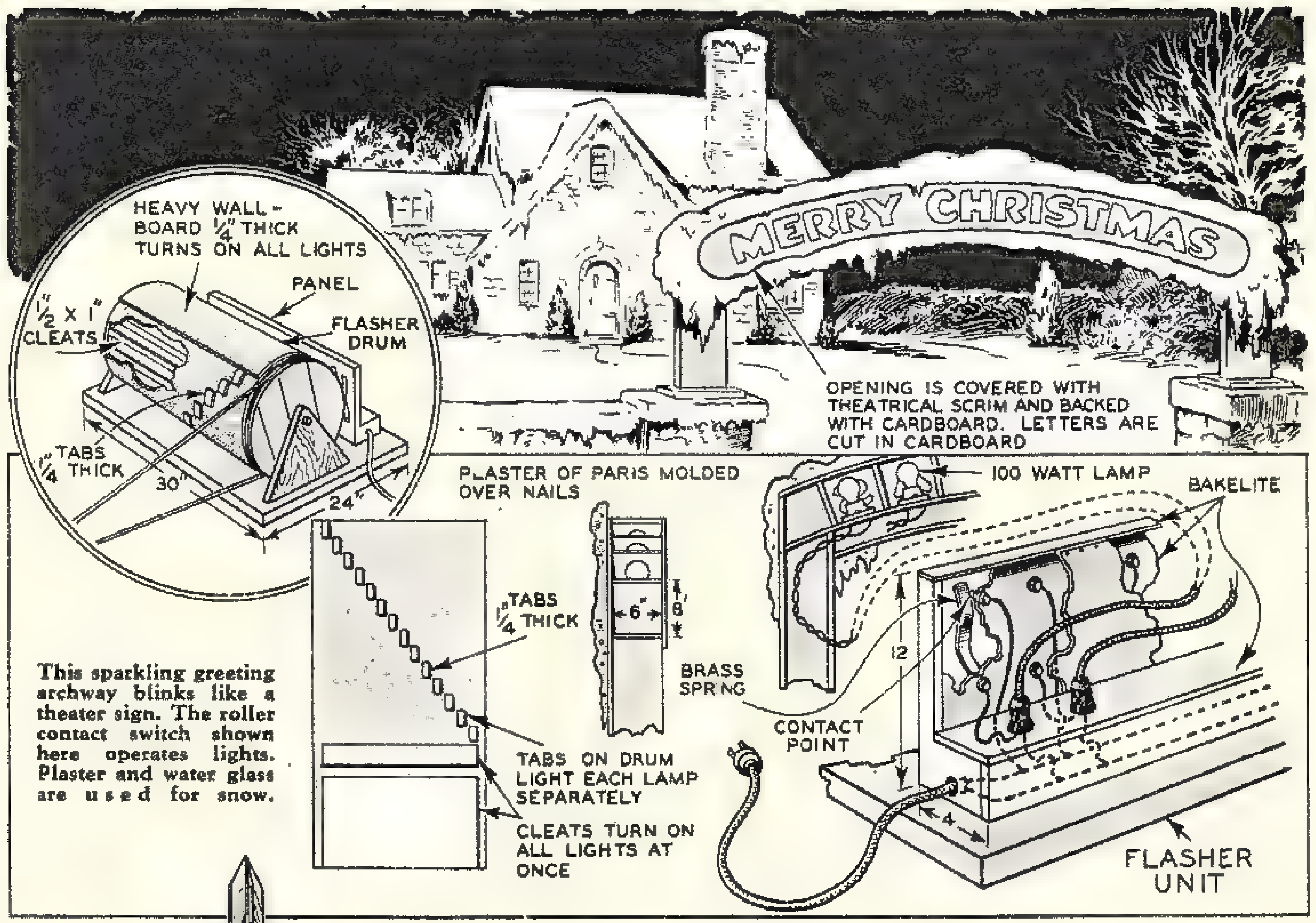
Examination of the circuit will reveal the use of three metal type tubes. A type 6F5 tube is used in the input, a type 6F6 in the output and a type 5Z4 rectifier tube in the power supply circuit. By wiring up these tubes according to the numbers appearing on the prongs in both the pictorial and schematic diagrams no difficulties will be encountered.

In order to operate the amplifier at its peak efficiency a novel code tone control is employed. One potentiometer serves as code tone control while the other is used to regulate volume. The volume control is fitted with an A. C. switch so that one control turns on the power and regulates the volume of the receiver as well.

A unique feature of this amplifier is the self-contained B and filament power supply for supplying current to a small short wave

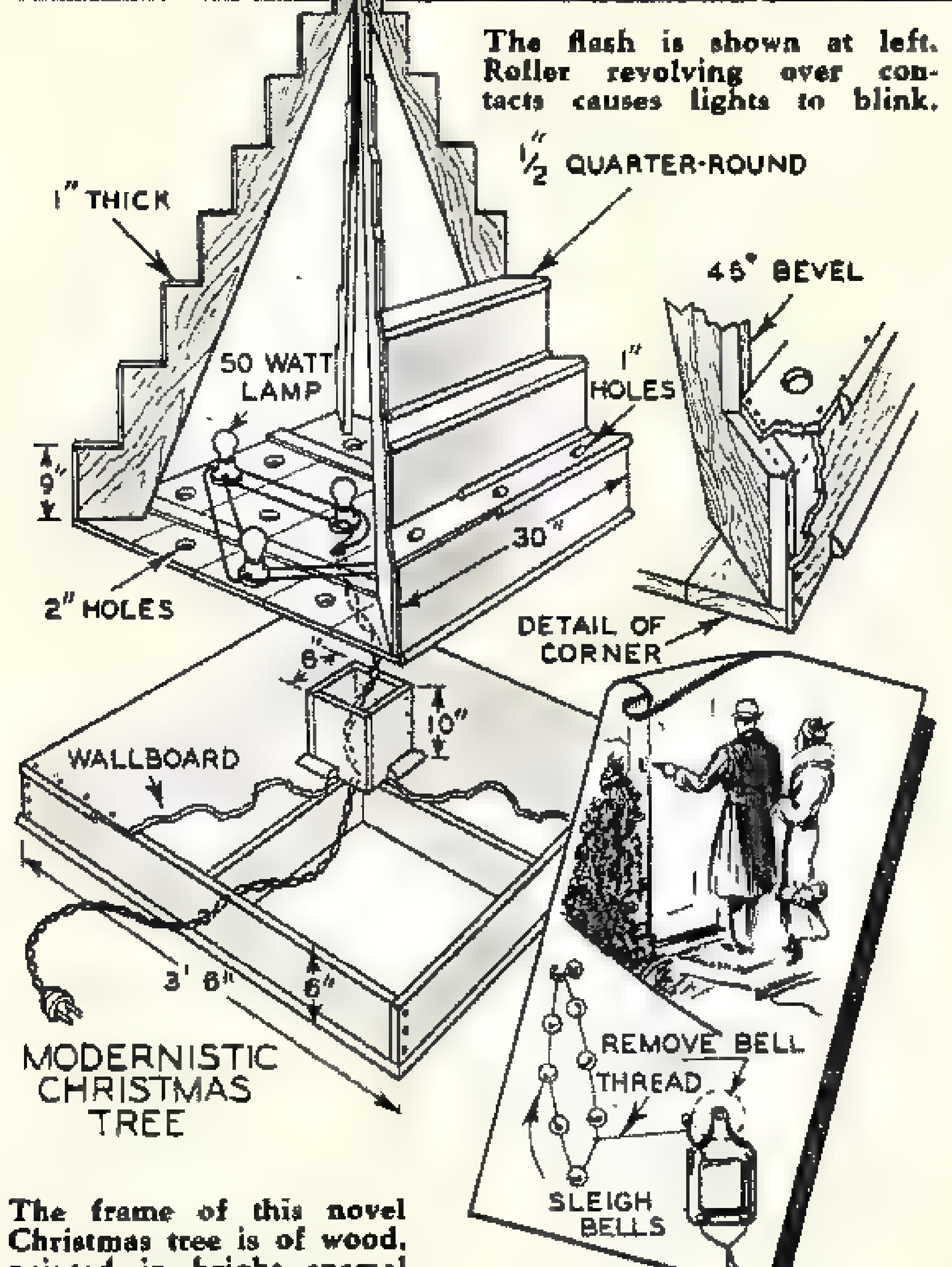
[*Continued on page* 132]

EXTEND HOLIDAY GREETINGS WITH OUTDOOR DECORATIONS


MERRY CHRISTMAS
HEAVY WALL-BOARD 1/4" THICK TURNS ON ALL LIGHTS
PANEL
1/2 X 1" CLEATS
FLASHER DRUM
1/4" TABS THICK
30"
24"
OPENING IS COVERED WITH THEATRICAL SCRIM AND BACKED WITH CARDBOARD. LETTERS ARE CUT IN CARDBOARD
PLASTER OF PARIS MOLDED OVER NAILS
1/4" TABS THICK
6"
8"
TABS ON DRUM LIGHT EACH LAMP SEPARATELY
CLEATS TURN ON ALL LIGHTS AT ONCE
BRASS SPRING
CONTACT POINT
100 WATT LAMP
BAKELITE
12
4
FLASHER UNIT

This sparkling greeting archway blinks like a theater sign. The roller contact switch shown here operates lights. Plaster and water glass are used for snow.

The flash is shown at left. Roller revolving over contacts causes lights to blink.


1" THICK
1/2" QUARTER-ROUND
45° BEVEL
50 WATT LAMP
1" HOLES
9"
30"
2" HOLES
DETAIL OF CORNER
6"
10"
WALLBOARD
3' 6"
6"
MODERNISTIC CHRISTMAS TREE
REMOVE BELL
THREAD
SLEIGH BELLS

The frame of this novel Christmas tree is of wood, painted in bright enamel with Cellophane covering.

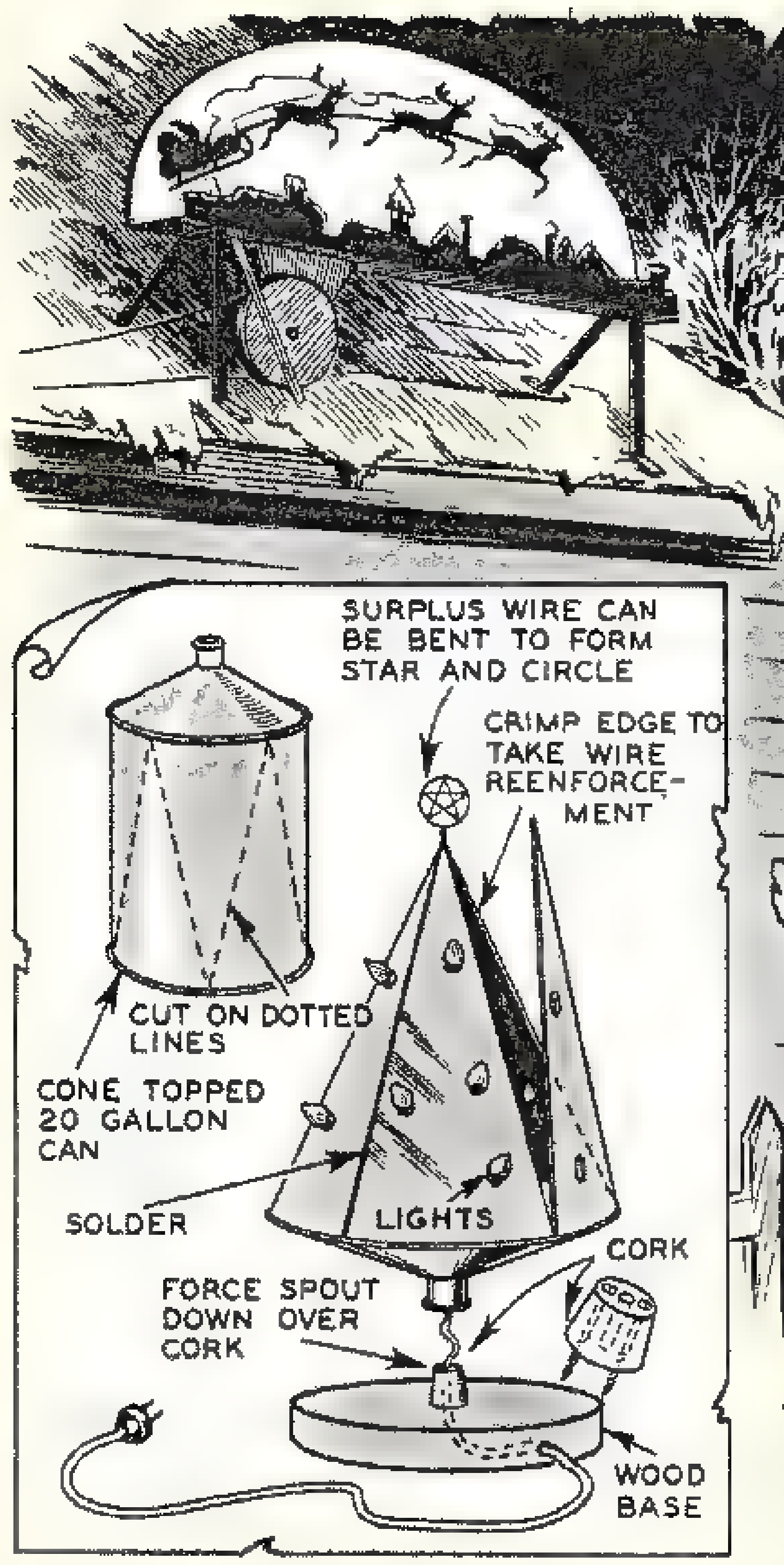
by David A. Brown

IN THE creation of novel Christmas decorations for the home, amateur craftsmen will encounter many interesting tests of skill and ingenuity. Carpentry, electricity and metal working all play a part in the adapting of the traditional symbols of the season to modern ideas of design and utility, and the workshop enthusiast who directs his attentions toward such a seasonable project is certain to enjoy many hours of entertaining work; his home will reflect the spirit of the occasion; and he will have the satisfaction of knowing that he has done much to preserve the beautiful customs long associated with this ancient holiday.

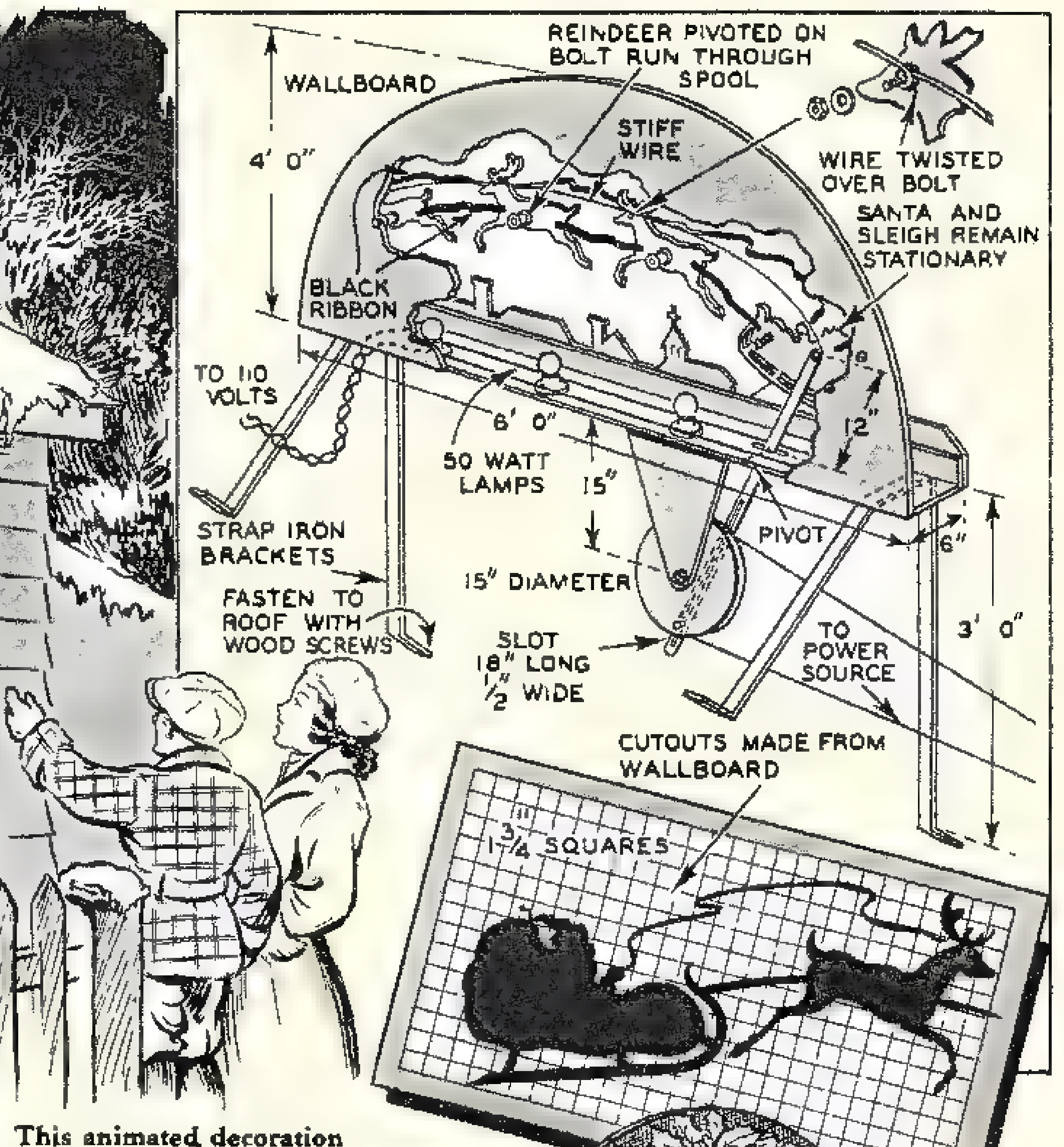
By combining light and shadow with motion, an unusual house top decoration may be contrived from the time honored Santa and reindeers. Cover the accompanying illustration with a sheet of tracing paper ruled into 1/8" squares and, with the intersecting lines as guides, transfer the figures to a 4'x6' piece of wall board which has been marked off into 1¾" squares. On similar material, lay out the semi-circular background. Cut out all pieces, and paint the silhouettes black and the background blue. Coat this last with shellac and sprinkle with mica sign painter's brilliants while still wet. Tack the house tops to the front edge and the background to the rear edge of a light trough constructed of 1"x6" material. Wire this trough to take four 50-watt blue colored light bulbs and cut the opening through which the slotted lever passes. Swing this lever on the shank of a long wood screw or heavy nail driven through it from the rear edge of the trough.

Screw two wooden candy pail lids together so that their beveled edges form a belt groove and mount it on a ¼"x3" bolt lock-nutted to the single wood support which projects down from the bottom of the light trough. A lock-nutted bolt set on the outer circumference

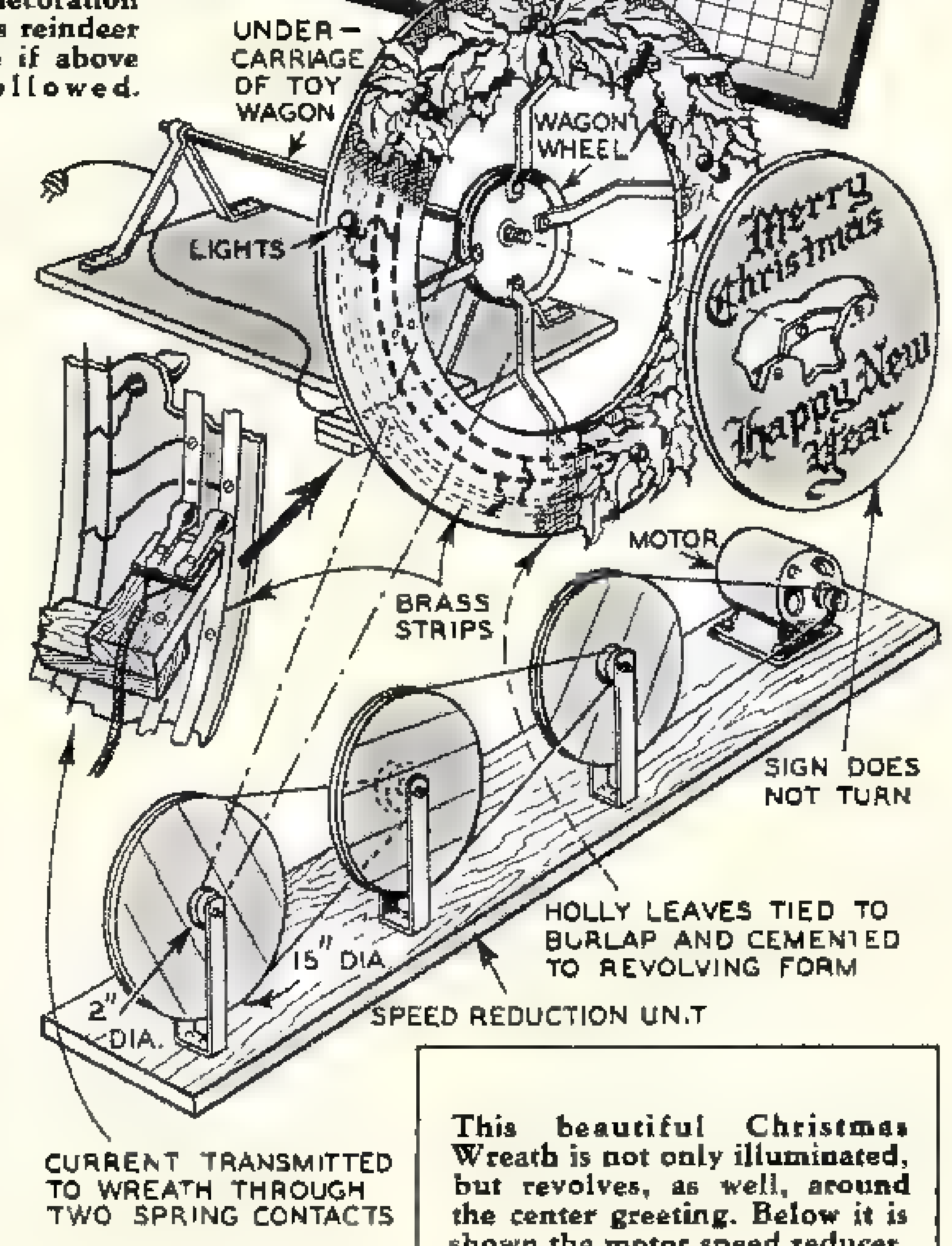
[Continued on page 132]


SURPLUS WIRE CAN BE BENT TO FORM STAR AND CIRCLE
CRIMP EDGE TO TAKE WIRE REENFORCEMENT
CUT ON DOTTED LINES
CONE TOPPED 20 GALLON CAN
SOLDER
LIGHTS
CORK
FORCE SPOUT DOWN OVER CORK
WOOD BASE

A 20-gallon oil drum provided this novel Christmas tree. Cut the can as shown, insert several sets of tree lights and then solder together and mount the tree on a suitable wooden base.

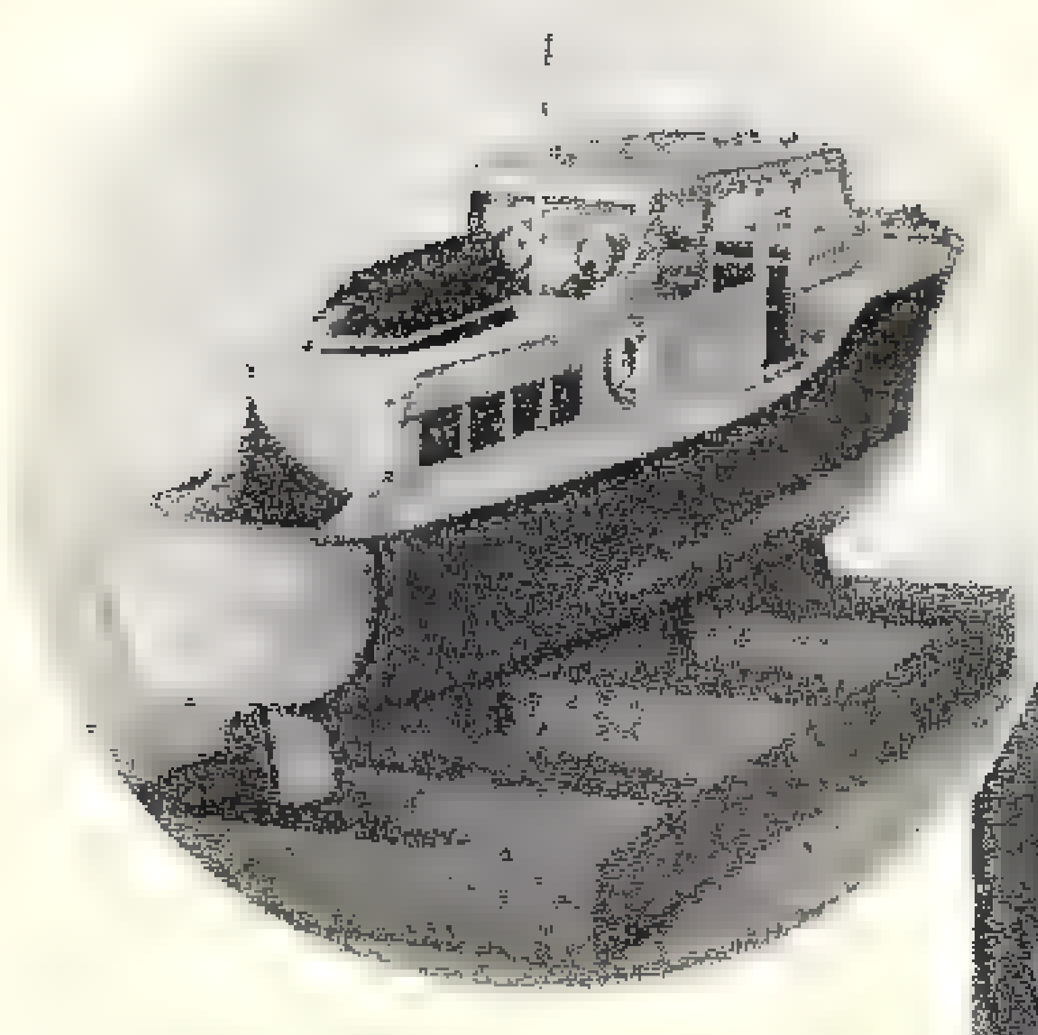

REINDEER PIVOTED ON BOLT RUN THROUGH SPOOL
WALLBOARD
4' 0"
STIFF WIRE
WIRE TWISTED OVER BOLT
SANTA AND SLEIGH REMAIN STATIONARY
BLACK RIBBON
TO 110 VOLTS
6' 0"
50 WATT LAMPS
15"
12"
PIVOT
6"
STRAP IRON BRACKETS
FASTEN TO ROOF WITH WOOD SCREWS
15" DIAMETER
SLOT 18" LONG 1/2" WIDE
TO POWER SOURCE
3' 0"
CUTOUTS MADE FROM WALLBOARD
1 3/4" SQUARES

This animated decoration of Santa and his reindeer is easy to make if above details are followed.

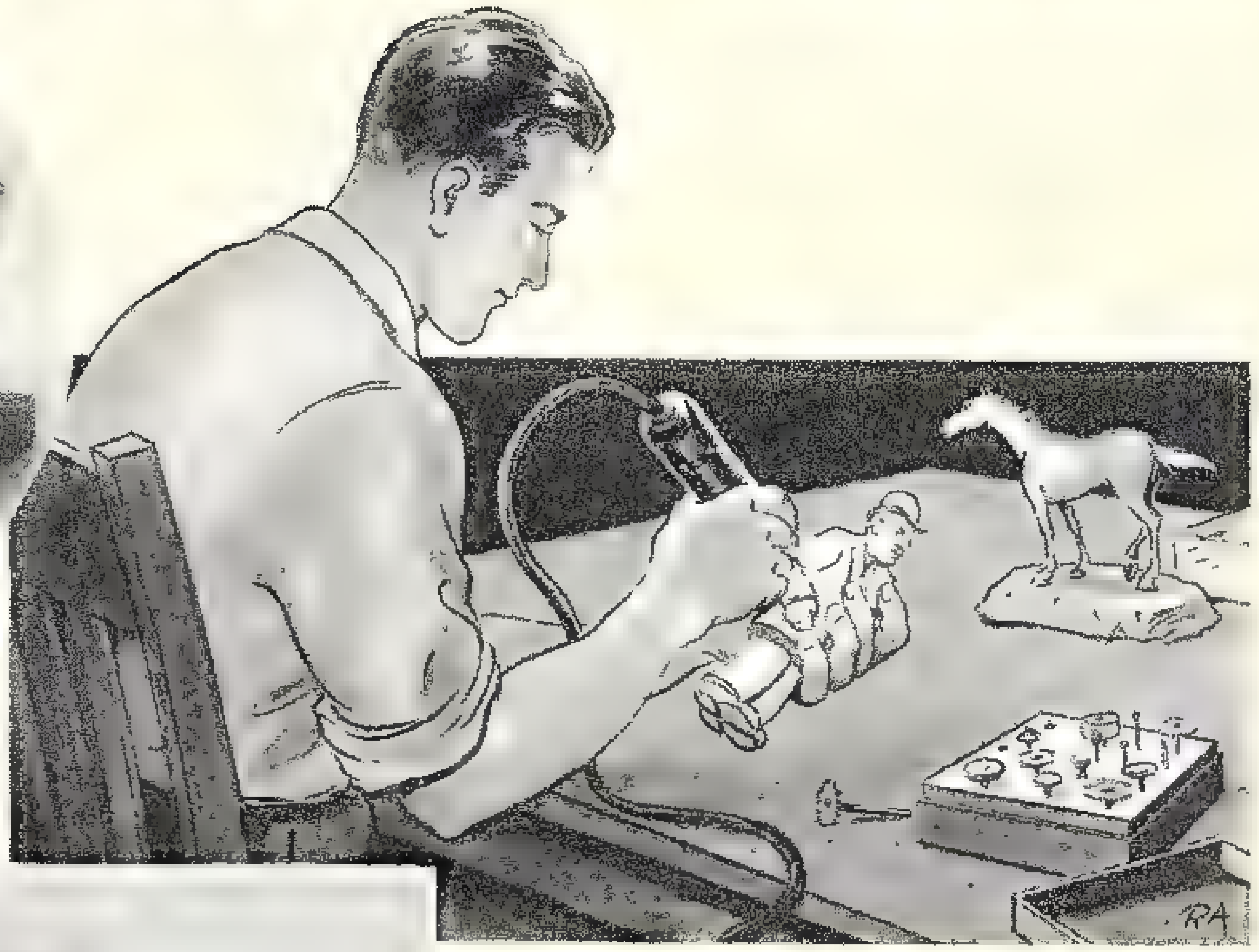

UNDER-CARRIAGE OF TOY WAGON
WAGON WHEEL
LIGHTS
Merry Christmas
Happy New Year
MOTOR
BRASS STRIPS
SIGN DOES NOT TURN
HOLLY LEAVES TIED TO BURLAP AND CEMENTED TO REVOLVING FORM
15" DIA.
2" DIA.
SPEED REDUCTION UNIT
CURRENT TRANSMITTED TO WREATH THROUGH TWO SPRING CONTACTS

This beautiful Christmas Wreath is not only illuminated, but revolves, as well, around the center greeting. Below it is shown the motor speed reducer.

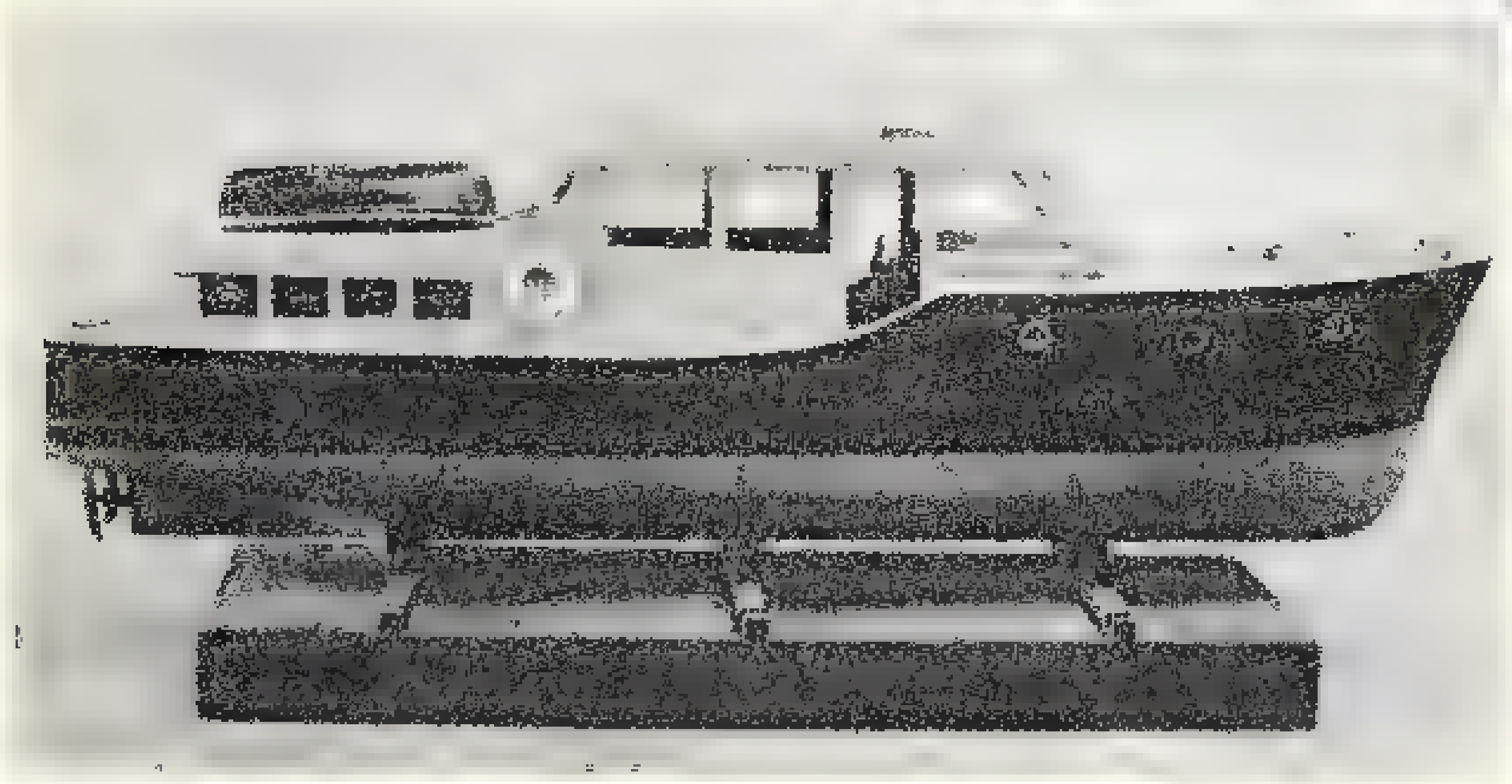
TINY HAND POWER GRINDERS SIMPLIFY MODEL CARVING



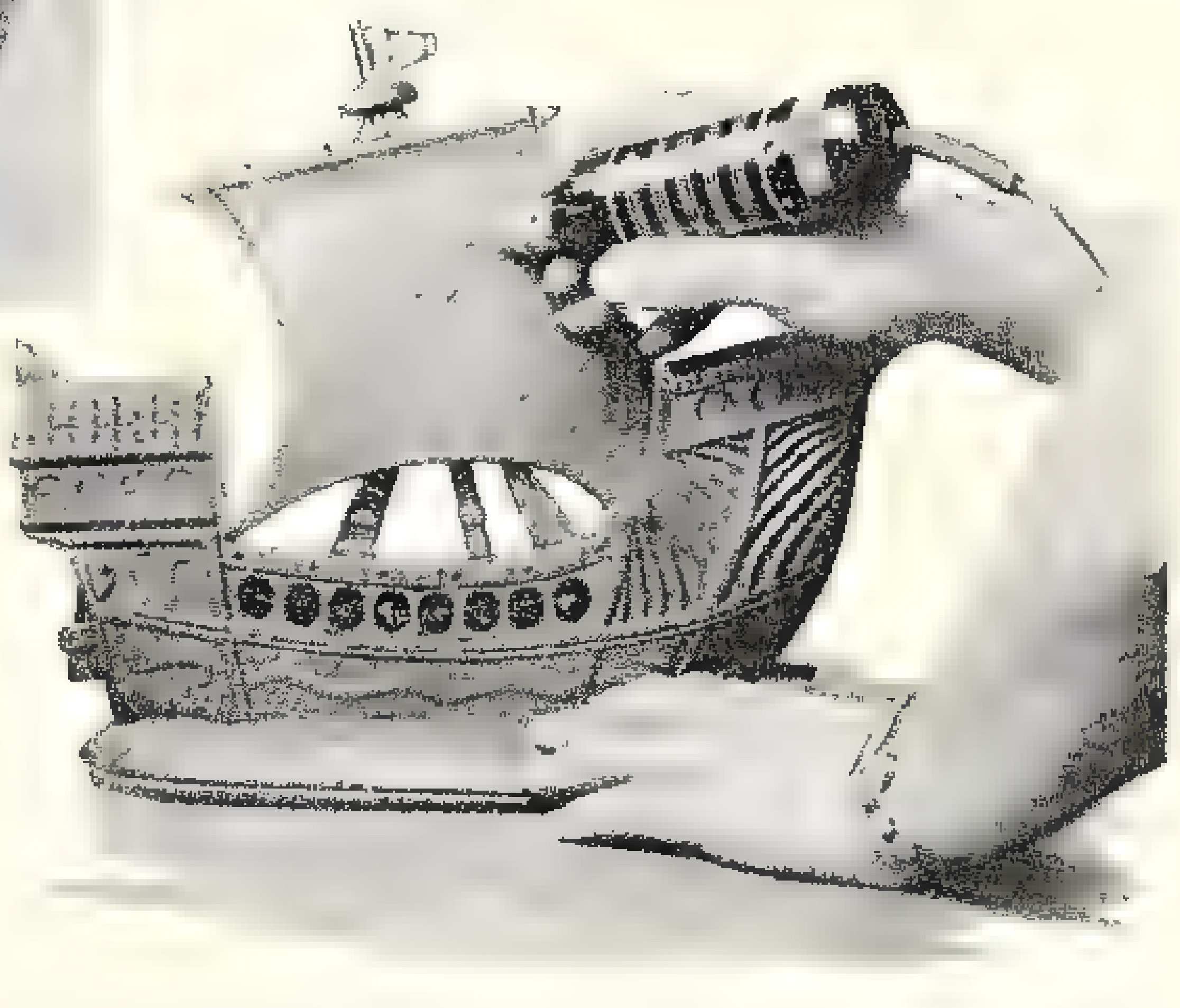
This model ship is just one of the many interesting projects that can be fashioned to exacting specifications by using a hand grinder for carving.



Interesting caricatures such as this one are easily carved from solid or laminated blocks of wood. The hand power grinder is provided with a chuck for taking numerous cutting, drilling and sanding tools.



Though it has all the marking of the professional modelmaker the miniature craft shown above was made by an amateur model fan. Some details and sanding were done by grinder.



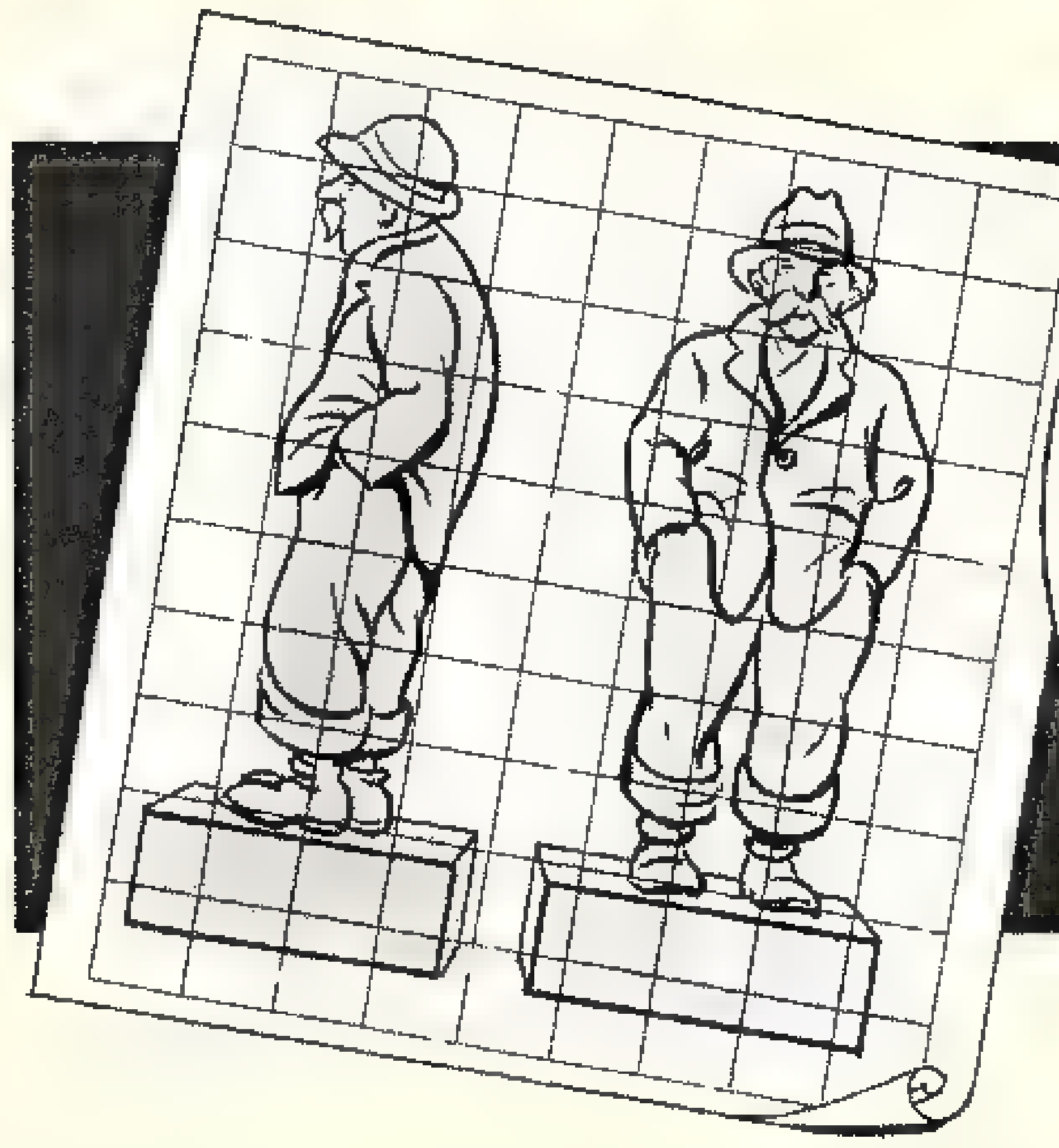
This attractive ship lamp nearing the final stages of completion was carved from a block of walnut. The tiny decorative designs are being applied to the sail with a finishing bur tool.

by A. T. Dalton

TO THE man who has a small workshop and limited room at his disposal yet who has a reasonable knowledge of wood-working and desire for carving there should be a very definite appeal in the new light weight portable high speed electric tools which allow a limitless variation of carving on wood, stone, cast resins and other material of this character.

These high speed, light weight, electrically driven tools are conveniently shaped to fit the hand and owing to their perfect balance can be used over long periods of time without danger of fatigue. The secret of their great usefulness for carving lies in their high speed. A large variety of especially developed steel cutters are used with the unit and leave smooth uniform cut and does not have to be finished by sanding or other means. This class of tool is, primarily, a finishing tool and thus lends itself to finishing work that has been roughed out.

Another method most frequently used is to cut plywood to the appropriate figure desired and glue the plywood together to form a laminated block. For the craftsman who has not had previous experience in woodcarving it is suggested that the rough figure to be carved be cut from a solid block of wood by means of a hand saw.



Carving wood caricatures is not difficult provided the figure is sketched in front and profile views on the block of wood. Comic strip characters also are excellent subjects for carving and are easily made.

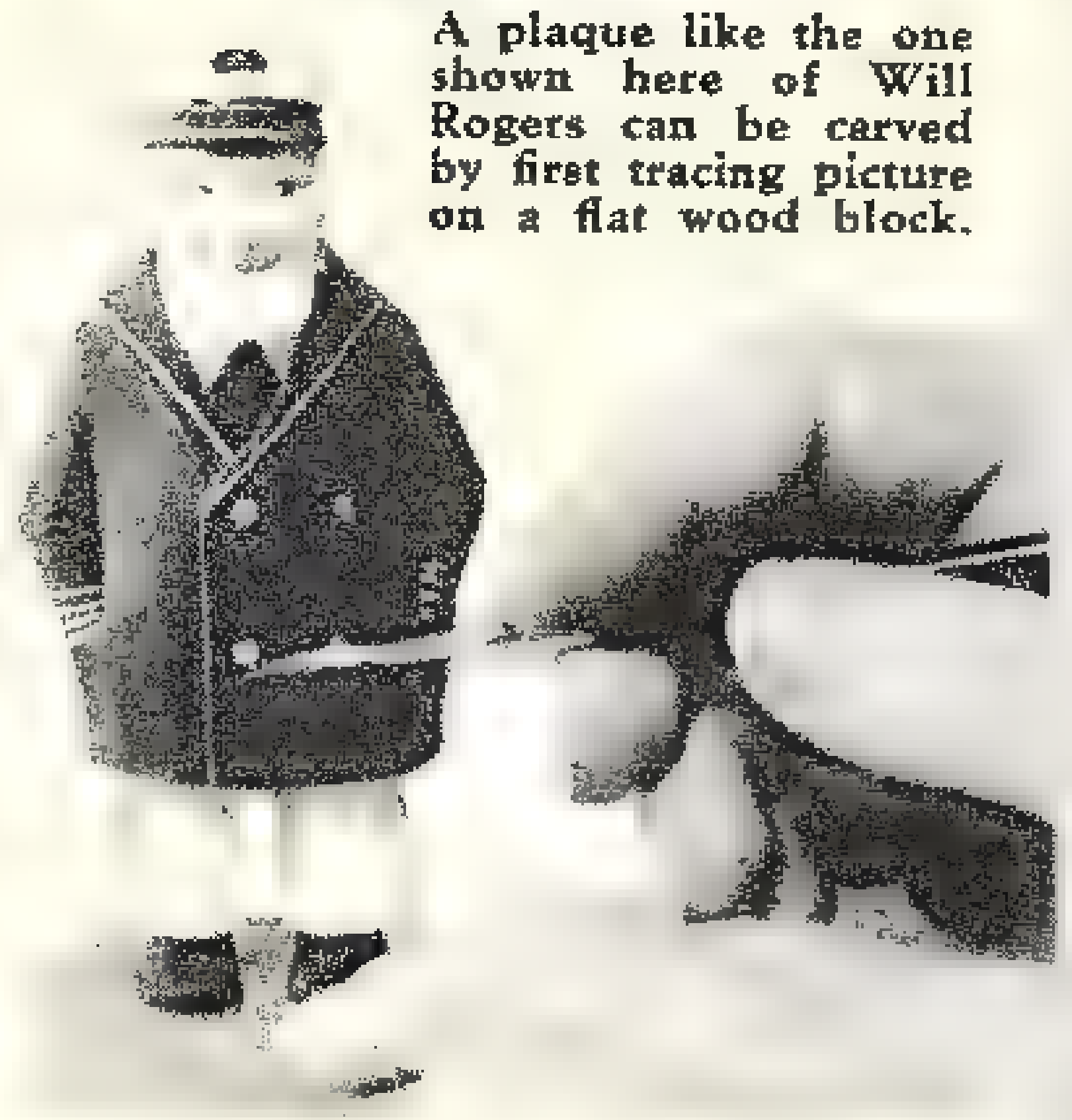
A plaque like the one shown here of Will Rogers can be carved by first tracing picture on a flat wood block.

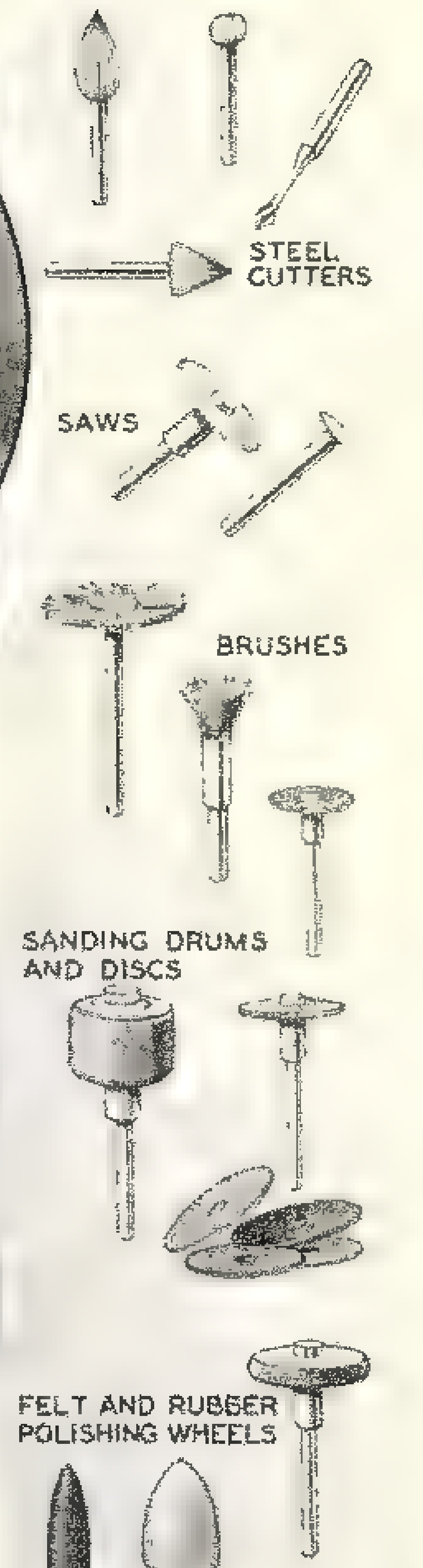
The figure shown in the accompanying illustrations makes an interesting project relatively simple for the amateur craftsman who wishes to try his skill with these new type of hand tools. There are no excessive details such as hands or background with this figure. The squared diagram shows the front and side views. Transfer these profiles to their respective positions on the wood-block which has been built up from plywood or, if you prefer, solid block of wood. The design can then be cut out with band saw, jig saw or with a hand saw.

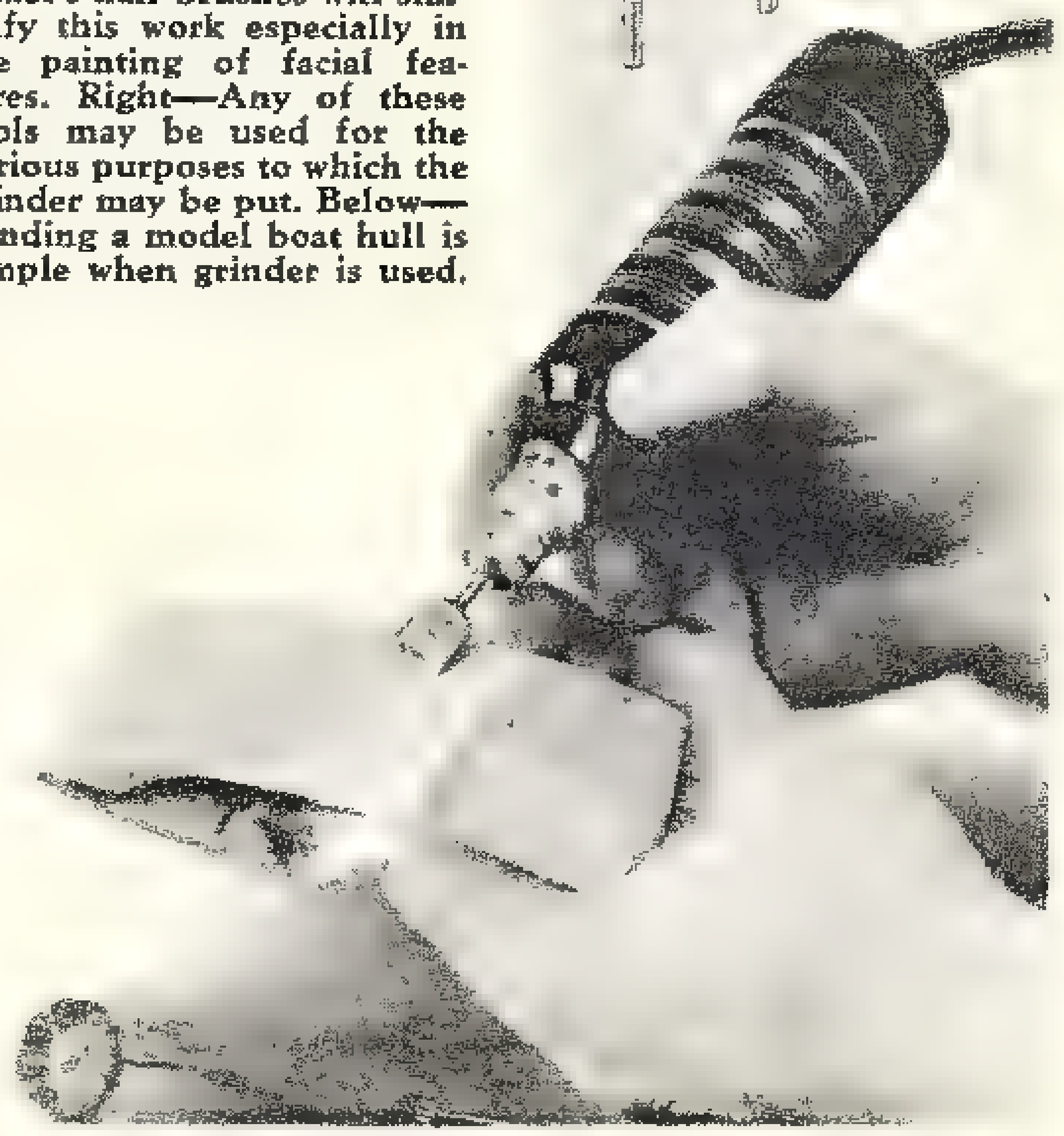
Using a rather large steel cutter rough out the design to the approximate figure following the outline given. Many craftsmen indicate the form that the model is to take by shading the design that has been drawn and transferred to the block. This often times serves as an excellent guide for bringing out different characteristics of the carving after it is actually underway.

It is difficult, and perhaps futile, to explain the step by step procedure to follow the modeling of the face for an example. With a design as simple as our first figure it is apparent that the cheeks, jaws and any portion of the fact are first cut with a relatively large steel cutter. Mustache, eyes, eye-brows and nose are formed with smaller steel cutters of the ball shape and flame shape, a large variety

[Continued on page 124]







Carved caricatures can be finished in a very attractive manner by painting them with colored india inks, water colors or lacquers. A few camel's hair brushes will simplify this work especially in the painting of facial features. Right—Any of these tools may be used for the various purposes to which the grinder may be put. Below—Sanding a model boat hull is simple when grinder is used.

COMPLETING the MODEL *Mayflower*

Authentic in every detail this miniature of the famous Mayflower can be built by anyone handy with tools. This final installment covers painting and rigging.

by Erling W. Eklof

PART III

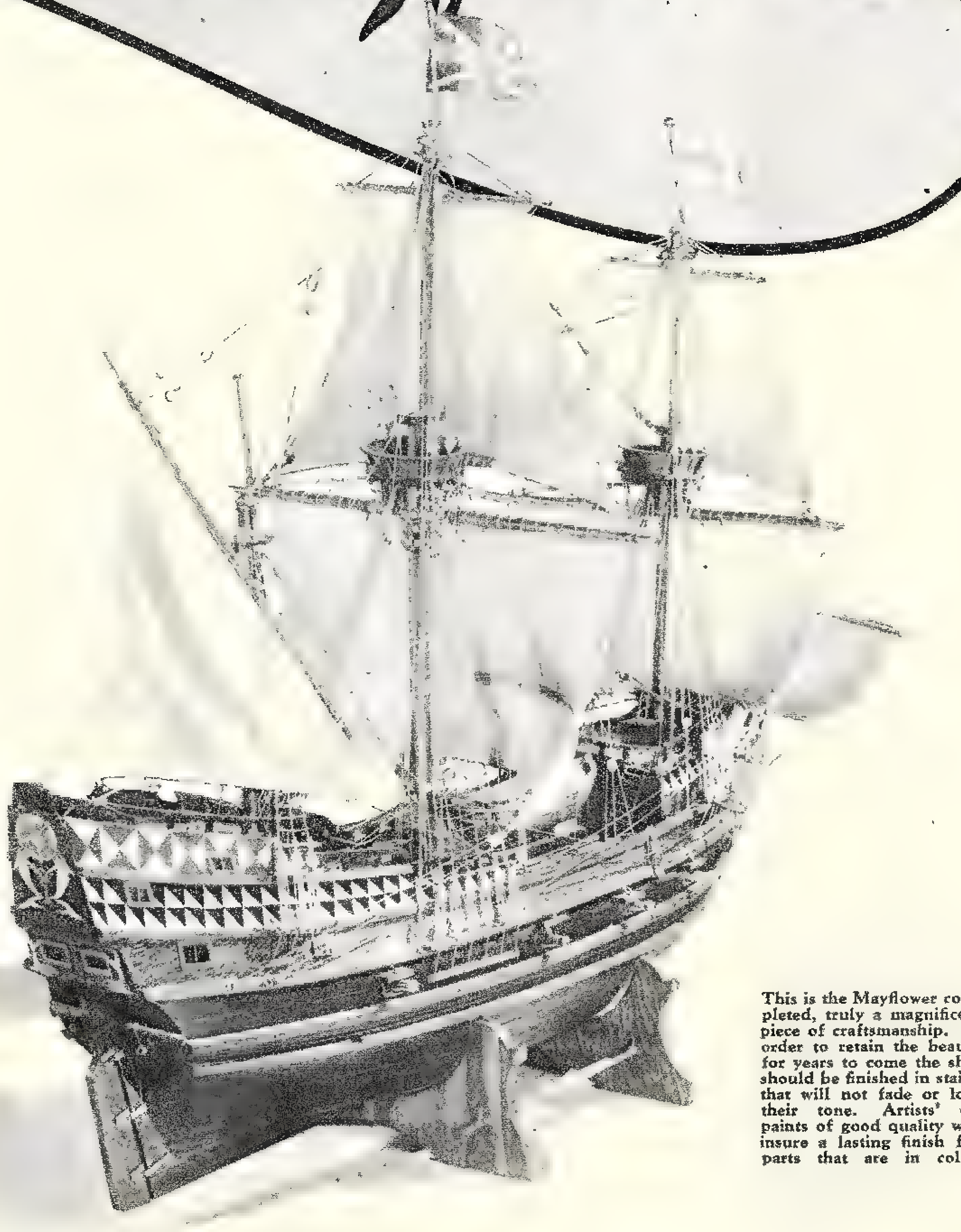
HAVING completed all hull and cabin details on the model *Mayflower* as described in the November and December, 1936, issues of MODERN MECHANIX HOBBIES AND INVENTIONS final work on the painting and sail rigging of the ship may be started. In these, the final stages of your model extreme care should be exercised in painting and assembling the sails and their rigging so as to follow out the authentic details as much as possible.

For painting the model, you will need at least one small sharply pointed brush to get into the small places and one flat ½-inch chisel shaped brush. You will also need one can of light oak stain and one can dark mahogany. To get the desired shades mix these two stains in varying proportions. Blue, white and black enamel and varnish will be needed as will tubes of oil paint in yellow ochre, Indian red, raw sienna and dark green.

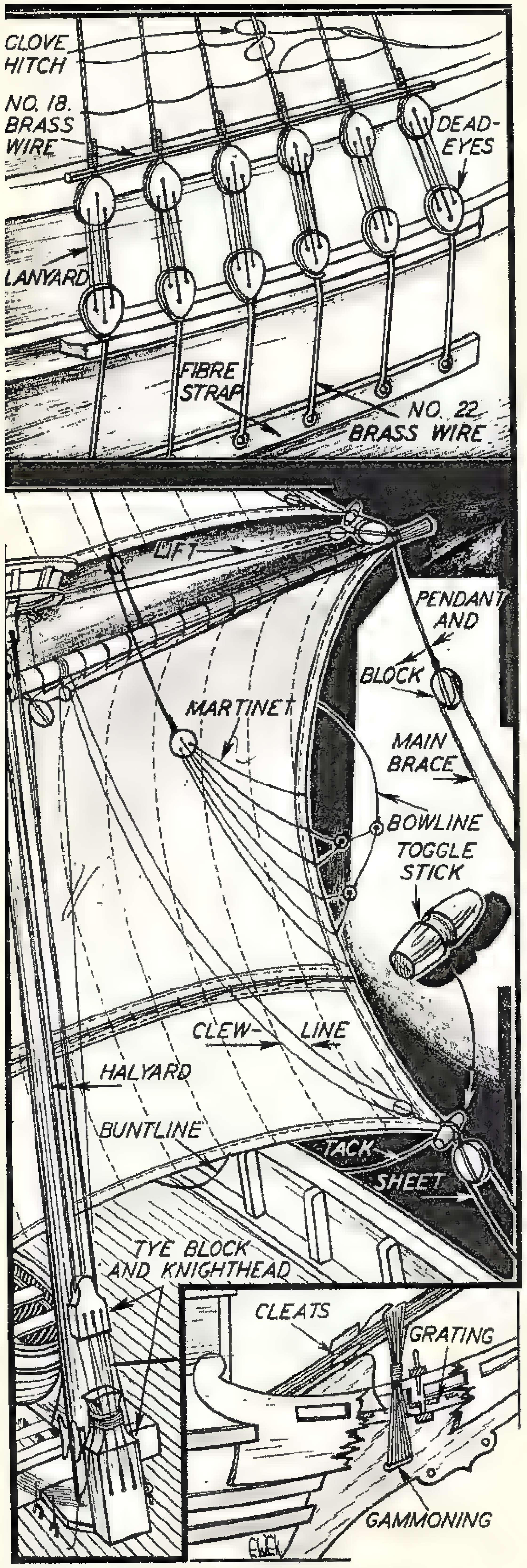
Now you can start the decks. You want a light natural woody color. Get this by using just a touch of dark mahogany in light oak stain. Don't let it get too dark. You want some contrast between the decks and deck fittings which will run to a little darker than medium brown. Make the inside of the bulwarks a little darker than the decks, and the timberheads a shade darker with railings and steps quite dark. You will find by rubbing a little Indian red on the steps, ladders and rails that they will get a slightly worn appearance as if human feet and elbows had rubbed off some of the finish.

The outside of the bulwark and wales is a rich brown chestnut color. The channel between the lower wales is black with Indian red brushed in and under the beak and trail boards some musty dark green. Below the wales, stain the hull dark brown. Rub some yellow ochre along under the water line where the hull has its greatest beam. Rub or brush in dark green under the counter and under her belly coming up in close to the stem. Blend in these colors as if worn in by the ravages of time. On the trail boards and rails at the beak the conventional design of the time in black and white and blue and white should be carefully painted on. The same applies to the stern castle sides. I chose blue because it is a symbol of water and the sea; also designating faith and hope which is particularly appropriate to the pilgrim ship. Over the design, rub in a few light rusty stains; just enough to make it appear old. Paint a fine thin red line on the upper edge. Make the masts and yards a medium reddish brown, the panels in the doors black. The indentations on the fluted capstan and the top of the capstan are black. The cleats are light and worn. Paint the long boat the same as the hull of the ship. The thwarts and sail locker are a natural wood color. Stain the oars and mast. The wales of the long boat should be light.

In regard to the design on the stern of the *Mayflower*, you need not adhere to my origination providing you have an appropriate design of your own. May I describe the symbolic significance of the design. The flower at the top of the design is a semi-heraldic rose, the rose being, as you perhaps know,



This is the Mayflower completed, truly a magnificent piece of craftsmanship. In order to retain the beauty for years to come the ship should be finished in stains that will not fade or lose their tone. Artists' oil paints of good quality will insure a lasting finish for parts that are in color.



The topmost illustrations show the Lanyard threading and dead-eye mounting arrangements. Sail rigging is simplified by lower diagrams showing how linen threads fasten to tackle.

same way. Drill one hole in place of three. By flattening the sides of the dowel, blocks may be made in the same fashion. Drill one hole near one end of the block. In the event that you have no lathe to use, you can reverse the process, drilling the holes in the end of the dowel, then grooving and cutting off with a hand scroll saw. Very fine blocks and deadeyes can also be purchased from ship model supply houses. It is essential that deadeyes and blocks should not be used too large or the appearance of the whole model will be spoiled.

Concerning the sizes of cord for rigging, the heavy rigging used for shrouds will be No. 5 mercerized crocheting cotton. For the medium, No. 10; for the light, No. 40, and for the fine used for lanyards and ratlines, No. 60 serves very well. This may be obtained at any dry goods store. Dye the heavy, medium brown, and the medium cord, just a tint lighter. The light and fine cord numbers 40 and 60 respectively should be dyed a tan color, a shade darker than ecru. To do this, draw the cord through dye or stain of the desired shade. If you wish, you may use linen fish line which, outside of being stronger, has no particular advantage.

After having stepped the masts glue in the bowsprit and lash it down with the gammoning. Use the heavy cord for this. Throw a hitch around the bowsprit and slide it down to the cleat. The cord goes through the forward end of the slit in the cutwater from the port side to the starboard. Then up around the bowsprit from starboard to port for about eight turns. Wind the cord around each half of this lashing and secure it with a clove hitch so you will be able to wind about five turns around the whole of the lashing. Fasten the end with a good knot and the gammoning is completed.

Next come the chain plates. They are the straps that go around the deadeyes and secure them in their position just above the chain wales. They are made of No. 22 brass or aluminum wire. Bend the wire around the deadeye and make a twist to secure it and then below where it fastens to the hull, make a small eye in the wire to take a pin. Where the chain plates are secured to the hull, there is an iron strap (make this with red fibre) that follows the sheer line. Be careful to keep the deadeyes even.

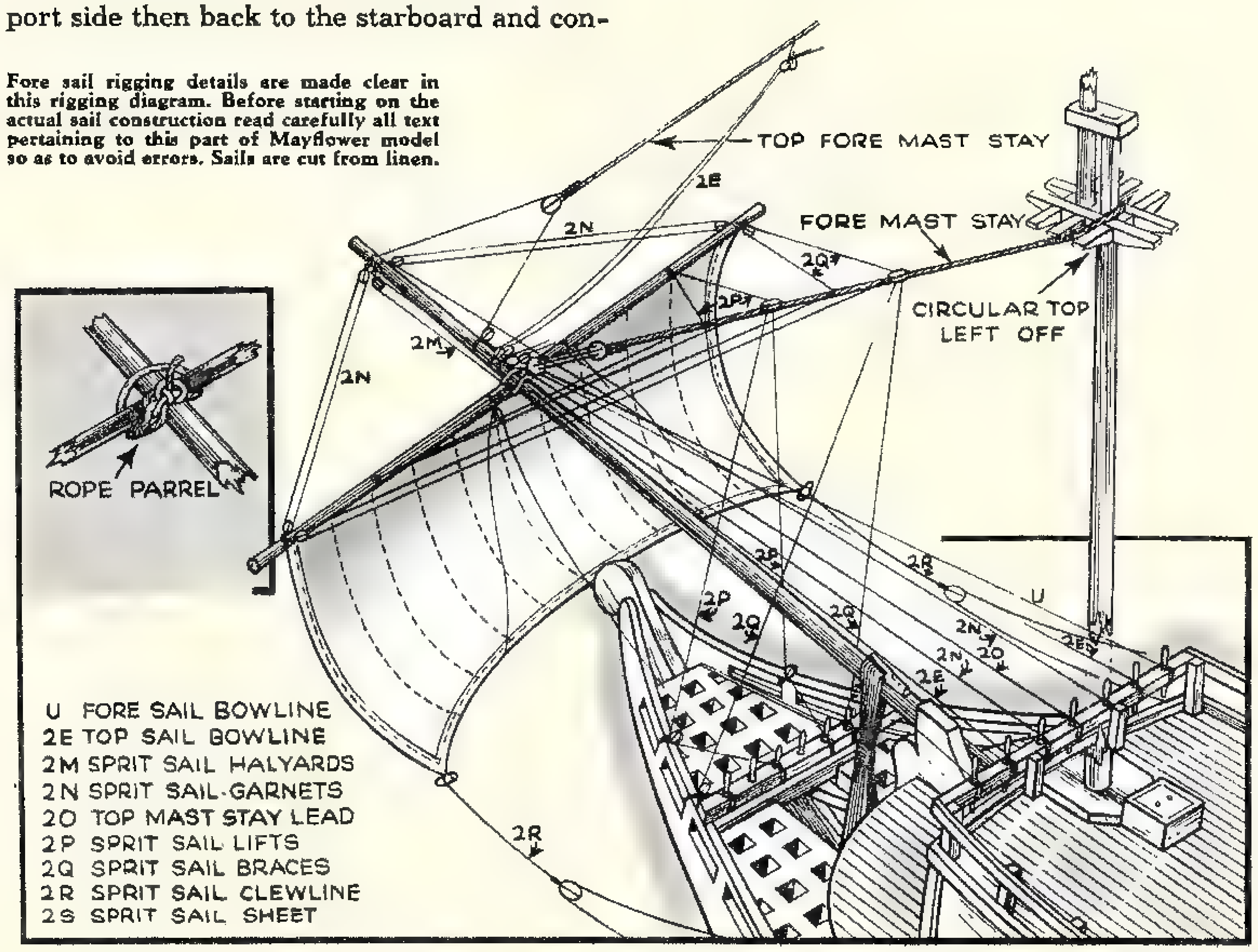
After you have all the chain plates and their deadeyes in place, take a piece of heavy cord and seize it around a ¼-in. deadeye. To aid in setting up the shrouds, make a U shaped sharp cornered form from No. 22 wire to hold the deadeyes about two of their lengths apart. Insert this wire form in the hole of a left hand deadeye on the chain wale and put the other end through the deadeye seized to the heavy cord. Now pass the cord up through the lubbers hole, around the mast and down through the lubbers hole on the same side, and seize a deadeye to its lower end, even with the first. Draw a lanyard of fine cord through these two deadeyes in this manner. First tie a knot in one end of an 8-in. cord. Reeve this through the right hand lower hole of the upper deadeye looking from the outside with the knot in back, then down to the upper right hand hole in the lower deadeye, then up to the middle hole of the upper deadeye, down on the outside to the corresponding hole in the lower deadeye, up again to the remaining hole in the upper deadeye, and down to the left hand hole in the lower deadeye and fasten with a clove hitch where the shroud is seized to the upper deadeye. Do not cut off the loose end as yet. Now take the wire form off of the first set of deadeyes and run the lanyards through them. Draw the deadeyes even and secure with clove hitches. Cut off the loose ends. Seize the two shrouds together directly under the cross trees. Do the same on the port side then back to the starboard and continue until all the lower main shrouds are on. Keep the mast in the central position, but leaning aft a little more than one part in thirty. When the main stays are put on, they will pull it forward to its correct position.

The fore and mizzen shrouds are done in the same method, but because of the odd numbers of the shrouds, they go around the masts and to the opposite side instead of in pairs on the same side.

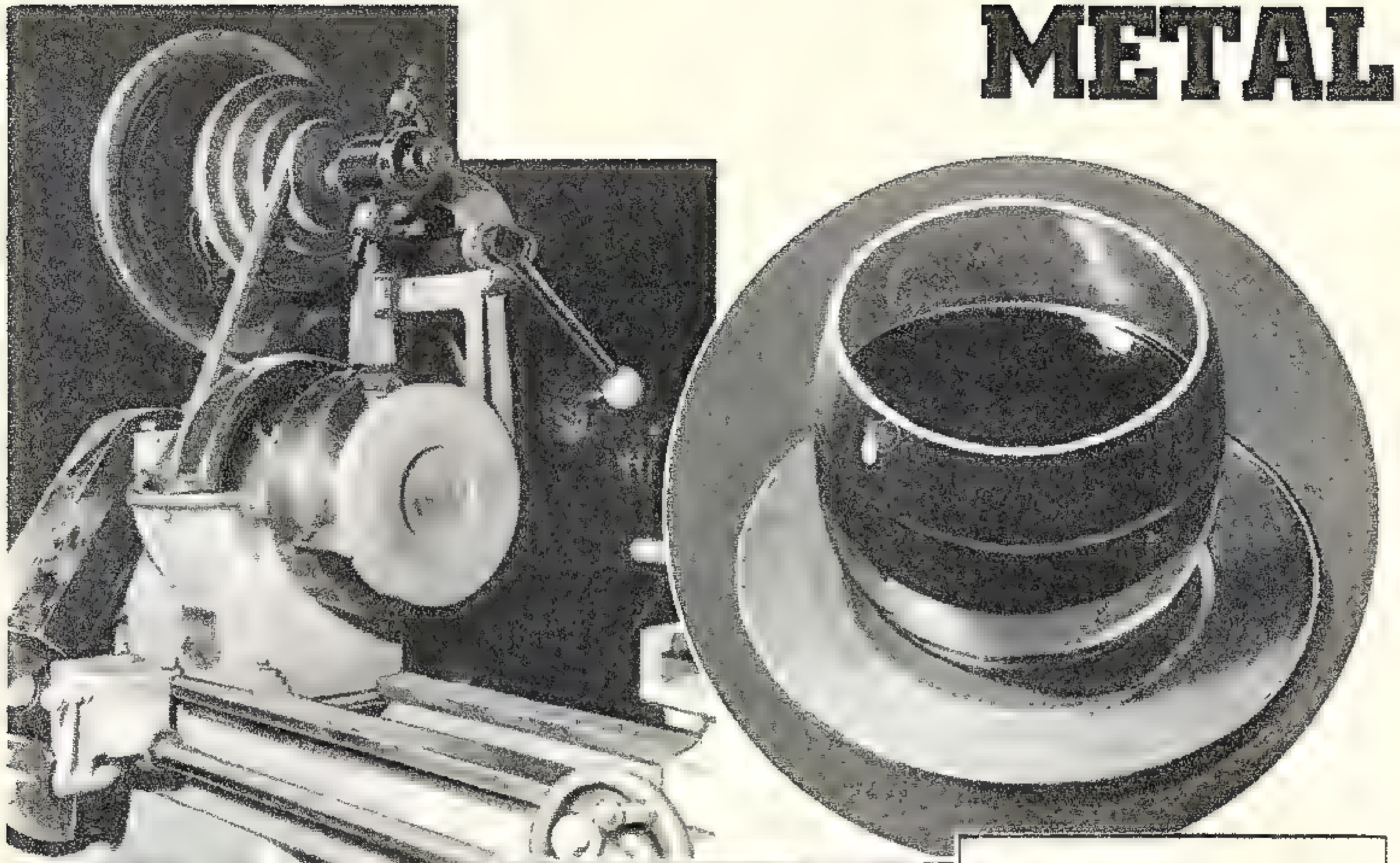
Let's get at the stays. Lay up three parts of heavy cord by fastening the three ends in something firm and twisting the other three ends with an ordinary hand drill. Two cords twisted similarly will serve as the mizzen stays. Saturate them with thin model aeroplane glue to keep them from unraveling. The main stay is double in the form of a strap. It goes up between the cross trees and around the mast; the other end goes through a hole in the stem. The whole stay is pulled together with a lanyard using the $\frac{3}{16}$-in. round deadeyes and passes on each side of the fore mast, the lanyard being situated immediately behind this mast. The fore stay is fastened by a lanyard, its lower deadeye lashed

[*Continued on page* 126]

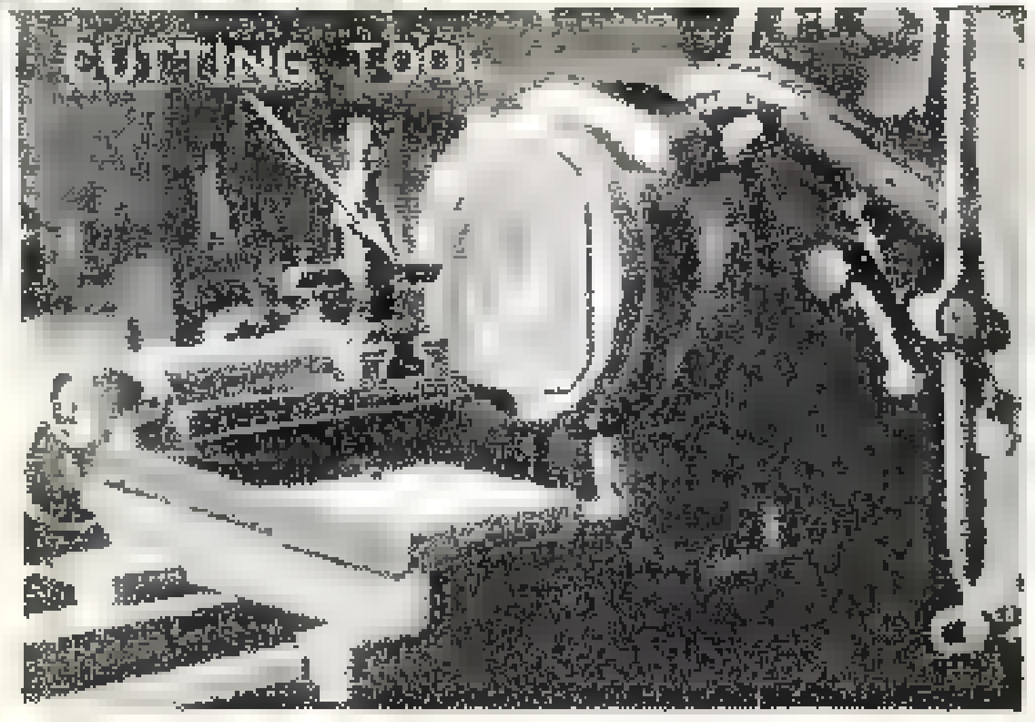
Fore sail rigging details are made clear in this rigging diagram. Before starting on the actual sail construction read carefully all text pertaining to this part of Mayflower model so as to avoid errors. Sails are cut from linen.



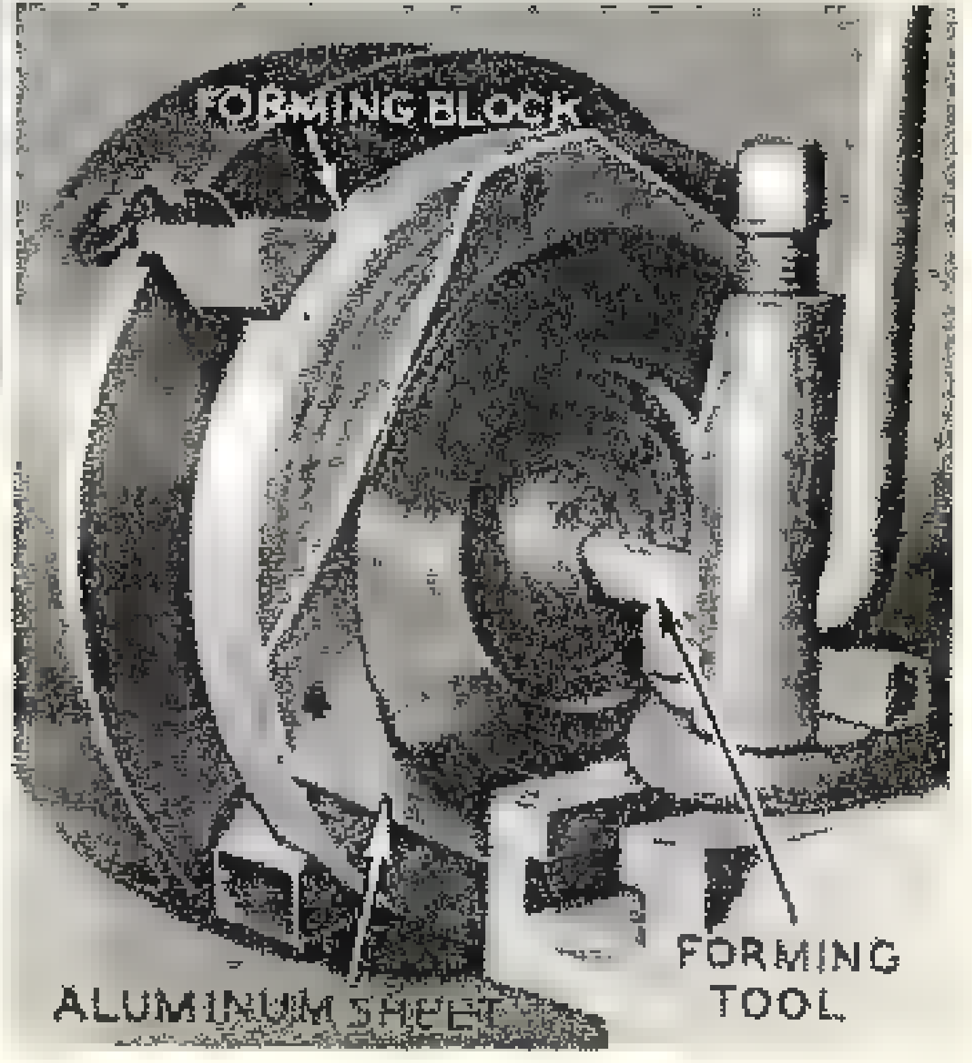
METAL PROJECTS ON A LATHE



The simple coaster pictured in the circle above is the ideal project for the beginner in metal spinning. Before any actual spinning is done a hardwood form or mold must first be made. Above is shown a completed mould in the lathe.



After the metal sheet has been turned to fit the wooden form the square corners are trimmed off with a regular lathe cutting tool.



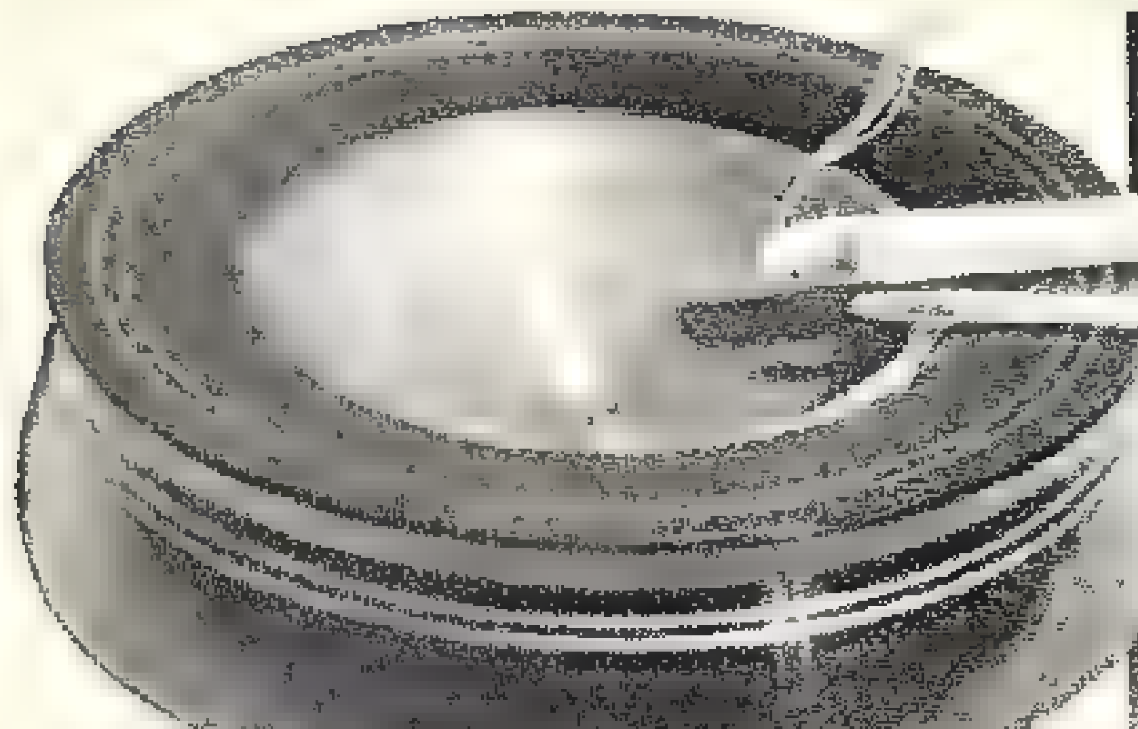
Right—In spinning this aluminum dish run the forming tool from the center of the work until the sheet metal follows the shape of the hardwood form.

by Dale R. Van Horn

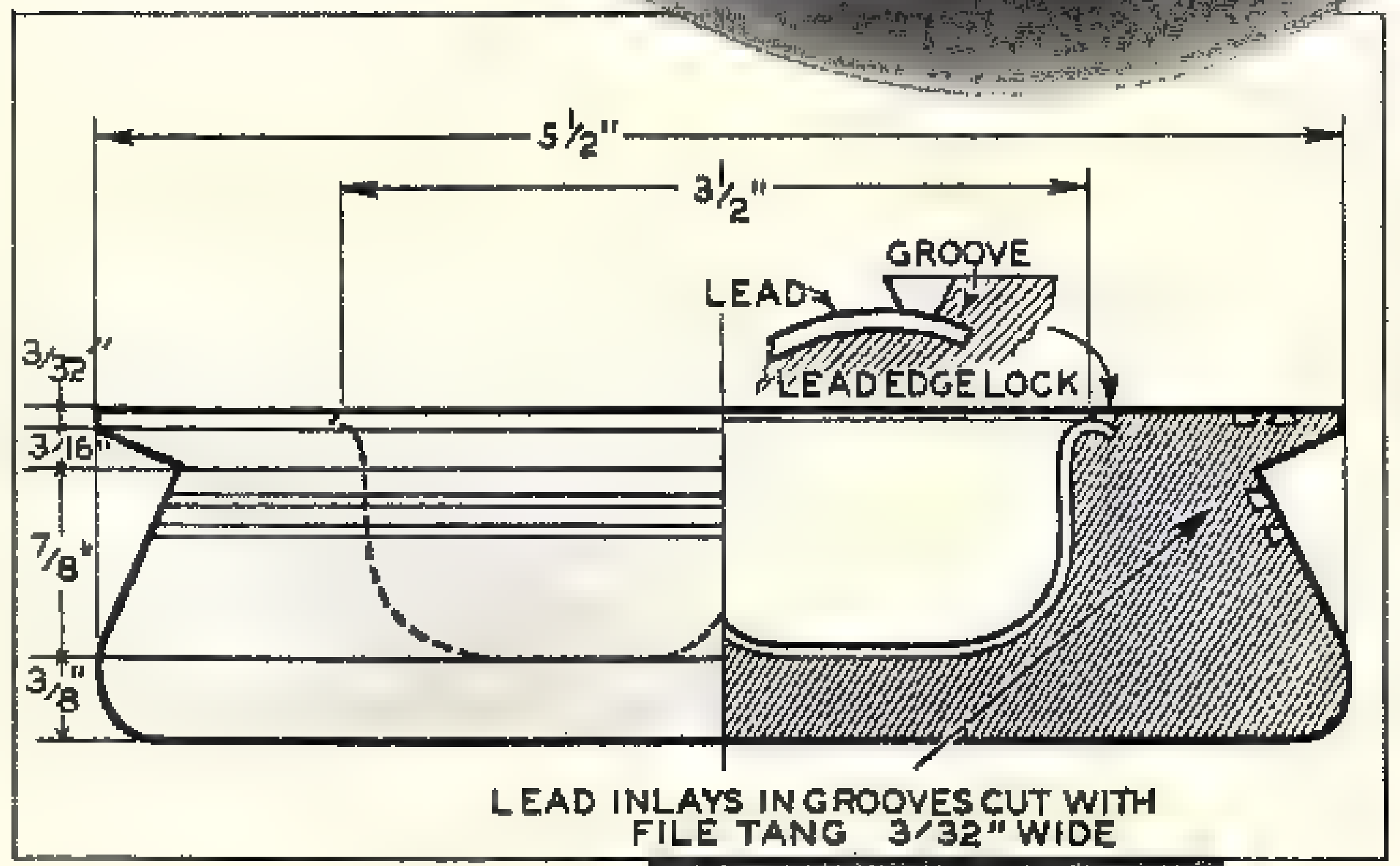
SOME soft metal lends itself so admirably to manipulation in a wood turning lathe, that projects involving its use are an interesting home shop diversion. With some patience one can turn out very presentable creamers, trays and boxes with lids from sheet brass, aluminum and copper.

Sheet lead is so ductile, easily worked and bears such a close resemblance to pewter when finished, that this metal is ideal for the beginner in spinning metals. This article covers briefly a number of simple projects, each one easily made. It also touches the use of a metal lathe for harder metals.

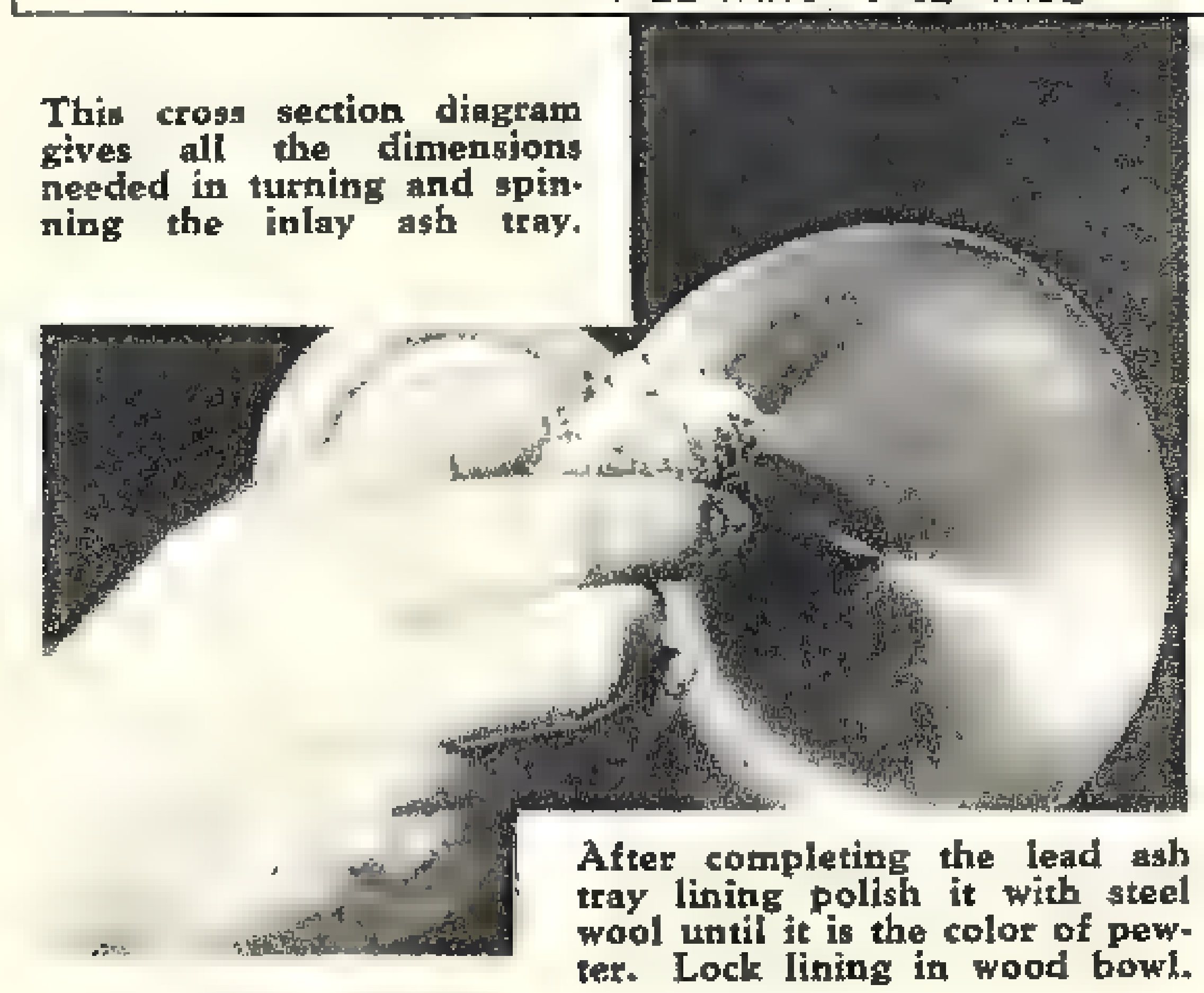
One of the easiest ways to spin soft metal dishes is as follows: Briefly, you need two pieces of wood and a sheet of metal. Turn one hardwood block to the shape you desire for the inside of the dish: Turn another small block from 1½ to 2 inches in diameter and about ½ inch thick with one side smooth, the other carrying the deep indentation of the dead center. The sheet of lead is centered between these two blocks, rubbed with candle and the metal gradually forced over the form. Should there be any tendency for the metal to work out of line, make a depression in the right end of the mold not more than the sheet metal thickness in depth and see that the tail stock wood block is a little smaller. Then turn the tail stock up tight. This forms a bulge in the metal sheet which locks it in position so long as the tail stock is turned up snug. After forming, the metal is polished, the waste trimmed off and the piece then dipped in lacquer. Sheet pewter, aluminum, copper and brass can be turned into small, attractive dishes in the same manner.



This beautiful inlay turning can be duplicated in your shop after doing some experimenting with the more simple projects. The bowl is turned from walnut and the inlays filled with strips of lead. The bowl lining is spun from $\frac{1}{16}$" sheet lead.



This cross section diagram gives all the dimensions needed in turning and spinning the inlay ash tray.



After completing the lead ash tray lining polish it with steel wool until it is the color of pewter. Lock lining in wood bowl.

Access to a metal turning lathe simplifies greatly, the work involved in forming shallow dishes from soft and semi-hard sheet metal. A little coaster of sheet aluminum of considerable thickness was formed in a jiffy in the metal lathe setup. The hardwood block turned to shape, acts as a mold for the coaster. Any round tool can be set in the tool post, then the metal forced to the shape of the mold and later the waste cut off. After forming the piece should be rubbed with coarse steel wool. Rough aluminum or copper pin trays can be made without special rigging in the wood lathe by using a wood mold and letting the edges take whatever shape they wish.

Let's next try a simple, all-metal ash tray which can be made in groups of four for home use or bridge parties. From a wholesale plumbing or hardware concern, get sheet lead having a $\frac{1}{16}$-inch thickness. Turn a soft wood block down in the lathe to 4 inches in diameter. Bend the lead corners over the side of this and tack in place. Start up the lathe and with the round end of a dowel, rub the lead flat against the wood. To reduce friction and heat and to prevent possible cutting of the lead by the dowel, rub the metal surface with a candle stub for lubrication. At high speed, rub this now smooth surface with fine steel wool to give it a good luster. Then wipe with a rag dipped in soda water or vinegar to cut off the grease.

Cut another block of soft wood 3½ inches square and rather thick, then with the drill press, bore a ½-inch hole from each of the four sides to the center of the block. Center this block in the lathe and turn away enough of the right side to expose half of the holes, turn the block round and sand smooth. The lead square is laid over this with the polished side next to the wood and the corners again tacked fast.

Using the dowel again, and the candle stub, the unfinished side of the lead is smoothed and worked into the shape of the wood mold. When the depression has been made, remove the whole unit from the lathe and, laying a

AMATEUR PHOTO PUZZLERS

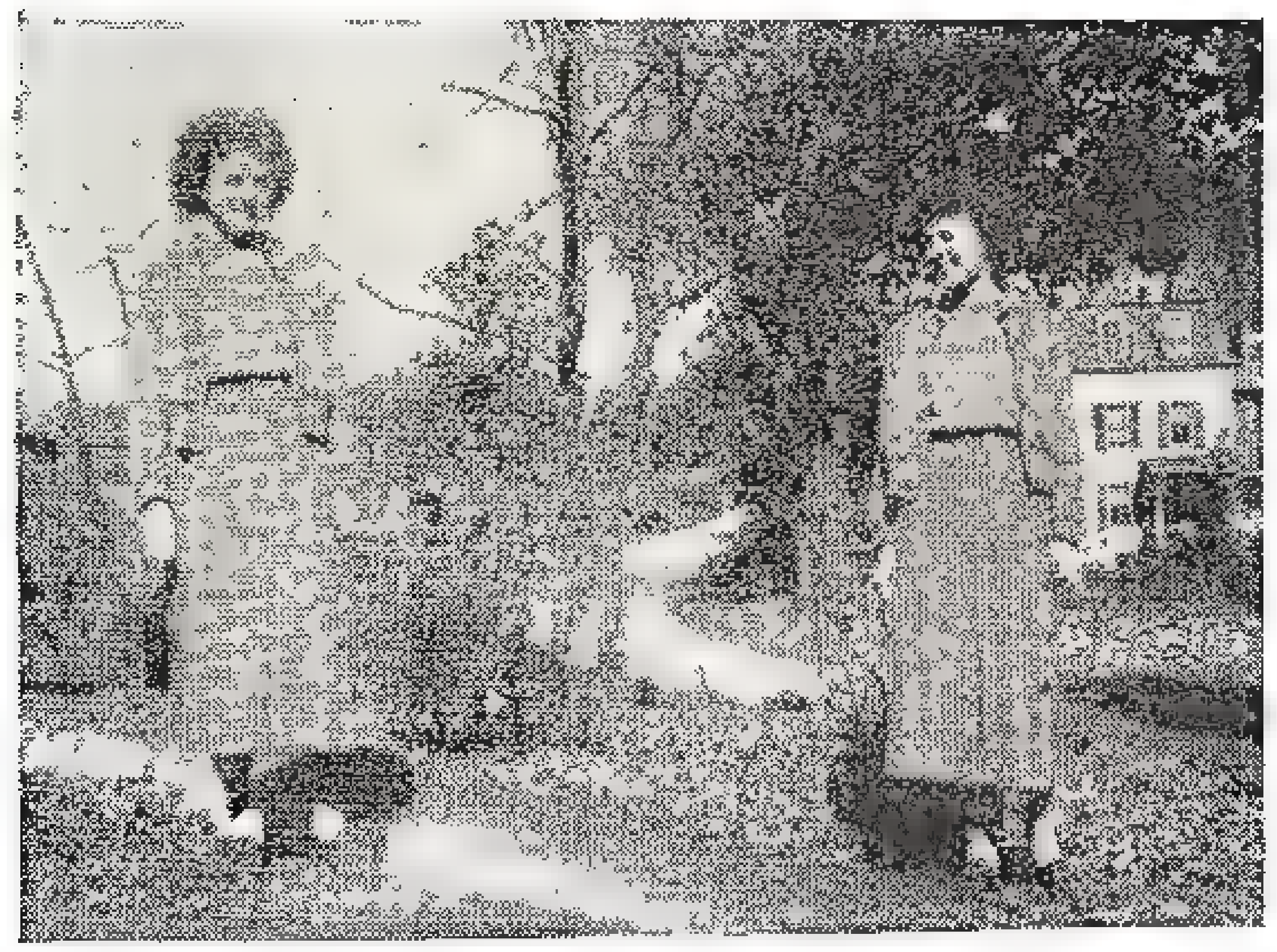
In this department the Photography Editor will answer any question or problem related to cameras of all types, enlarging, printing, developing, taking pictures, and the various phases of home movie making. When sending questions to this department, be sure to include a stamped, addressed envelope in case space does not permit publication of the question and reply on this page. Send all inquiries to the Photography Editor, Modern Mechanix Hobbies & Inventions Magazine, *22 West Putnam Avenue, Greenwich, Connecticut.*

MAKING A COPY OF SNAPSHOT PRINT

I have a small snapshot picture which I treasure very highly. I would like to secure an enlargement of this picture, but since I no longer have the negative I have been in doubt about the possibility of this. Since I know very little about photography I am wondering if you can enlighten me on this matter.—Grace Cook, Dover, Delaware.

Good enlargements up to 8 by 10 inches can be secured from small snapshot prints simply by photographing the snapshot on a fine grain film and enlarging this film to the particular size desired. Any photographer can do this work for you. The cost is nominal.

TRICK PHOTO RECEIVES $5 AWARD



By exposing one half of the film at a time with a "duplicator" Harvey Herdman, Branchville, N. J., secured this unusual picture. The girls are not twins, but one and the same person. For his clever photography Mr. Herdman receives $5.00.

ACTION PICTURES WITH BOX CAMERA

Is it possible to take action pictures with a box camera? Last month I attempted to take pictures of some of the exciting plays during our school's football season, but the results were very disappointing. What kind of camera should be used for taking action pictures?—David Rendown, Philadelphia, Penna.

Action pictures cannot be taken with a box camera since it is fitted with a lens that is entirely too slow for the purpose. Action pictures, if they are to be clear, must be taken with a camera having a f.2 or faster lens. The usual box camera lens is an f.8 which is, as you can well see, too slow for recording action scenes.

The photograph editor will pay $5.00 or $3.00 each for photographs interesting enough for publication on this page. All pictures should be mailed to Modern Mechanix Publishing Co., Greenwich, Conn.

Kodak Christmas Guide

FOR THOSE WHO LIKE THEM SMALL

☆ *Miniature Kodaks*

$57.50

KODAK DUO SIX-20

A true "miniature"; compact, finely built, yet it takes 16 album-size pictures (1⅝ x 2¼ inches) on a roll of Kodak Film (four types available). Negatives are sharp; give big, clear enlargements. Shutter, 1/500 Compur-Rapid. Lens, Kodak Anastigmat *f*.3.5. Price, $57.50.

$57.50

KODAK RETINA

Concentrated photographic versatility . . . lens, anastigmat *f*.3.5; shutter, Compur-Rapid—9 speeds up to 1/500 second. Loads with any of five different Kodak Film Magazines (including new Kodachrome for full-color transparencies). Negative size approximately 1 x 1½ inches. Price, $57.50.

KODAK BANTAM SPECIAL

This exquisitely made "miniature" fits the hand. Lens, Kodak Anastigmat EKTAR *f*.2.0. Shutter, 1/500 Compur-Rapid. Military-type range finder, coupled with focusing mechanism. Makes needle-sharp negatives for superb enlargements (low-cost size, 2¼ x 4 inches); or Kodachrome transparencies. Price, $110.

$110

FOR THOSE WHO LIKE THEM LARGER

☆ *Precision Kodaks*

KODAK SIX-16 (f.4.5)

Smallest folding camera taking 2½ x 4¼-inch pictures. *F*.4.5 lens; 1/400 Compur-Rapid shutter. Price, $40. (With *f*.6.3 lens, $20; with Doublet lens, $16.)

$40

KODAK RECOMAR 18

Advanced amateurs delight in its *f*.4.5 lens, 1/250 Compur shutter, self timer, ground-glass focusing back. Loads with film packs, cut film, plates. 2¼ x 3¼. Price, $54.

$54

KODAK DARKROOM OUTFIT NO. 1

Contains trays, chemicals, developing clips, safelight, printing frame, thermometer, instruction booklet—everything necessary for first-class work. Also includes the book, "How to Make Good Pictures." Price, complete, $8.75.

$8.75

FOR THOSE WHO WANT MOTION

☆ *Ciné-Kodaks*

CINÉ-KODAK EIGHT

Movies at "10 cents a shot"! The "Eight" makes it possible. A roll of Ciné-Kodak Eight Panchromatic Film costs only $2.25, *finished, ready to show*. Good for 20 to 30 black-and-white movie "shots," each as long as the average scene in the newsreels. Price, $34.50.

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CINÉ-KODAK "K"

Most widely used 16 mm. home movie camera—it's so simple, yet so fine. Makes clear, brilliant movies at the touch of a button. And as the user's skill increases, responds to every exacting demand. Loads with full 100 feet of 16 mm. film. With *f*.1.9 lens, $112.50.

$112.50

MAGAZINE CINÉ-KODAK

Loads in 3 seconds. Slip in the magazine, close camera cover, and shoot. And you can switch to another film in a jiffy, even when but part of the 16 mm. film has been exposed. Effortless loading is only one of six new features. With *f*.1.9 lens, $125 . . . Eastman Kodak Company, Rochester, N. Y.

$125

ALL CINÉ-KODAKS MAKE FULL-COLOR MOVIES ON KODACHROME FILM

Behind The Razor Blade

[*Continued from page* 61]

breakdown. The dies these men produce are accurate to one ten-thousandth of an inch.

After perforating, the blade strip is gauged for centrality—a measurement from the center slot to either edge. This distance must be held constant. The importance of accuracy here can scarcely be over-emphasized, since centrality of the slot controls the proper positioning of the blade in the razor.

Since the hardening process requires a surface absolutely clean, the coils of steel are "laundered" in the de-greasing machine immediately before entering the hardening furnace. The de-greaser passes the perforated coil through a soda wash, through high pressure jets of water just under the boiling point, through blasts of compressed air, a scrubbing box, a tank of special grease solvents, through jets of live steam, and finally compressed air again.

The razor blade makers were the first to recognize the fact that steel received from the rolling mill cannot be uniform, even in a single coil, and that to produce a uniform finished product, the temperature of the hardening furnace must fluctuate to compensate for these variations.

Since the furnaces maintain a temperature of approximately 1500 degrees Fahrenheit, and the difference between a good and a bad blade can be affected by a change of only 10 or 12 degrees, the control for the hardening furnace must be extremely sensitive and entirely automatic.

A "magic black box," situated midway of each furnace, furnishes this automatic control. A master strip of steel of exactly the correct temper is inserted in this box. If the steel in process does not match this master strip exactly in hardness, the magic box flashes an impulse to a control panel regulating a battery of automatic switches, and the amount of electricity flowing to the furnace is altered the required amount to bring the steel to the desired standard.

It is in the hardening furnace that the distinctive blue effect of a blade is obtained. A patented apparatus feeds a special mixture of gases to the furnaces, and the blue becomes part of the steel itself.

As the strip of steel leaves the hardening furnace it passes through the tempering plates that make the center section easy to flex when the blade is placed in the razor. A coat of rustproofing oil is then applied before the coil is rewound.

Samples are broken off of each coil after it leaves the furnace, to be submitted to a hardness test under a diamond-pointed instrument. If a sample fails to meet the required standard the whole coil is rejected and the furnace is stopped until the trouble can be found and remedied.

These samples are then sent to the cathode ray oscillograph—the electro-magnetic tester previously described. Variations of hardness and temper, or any hidden flaws or strains, are revealed here by a green line of light flashing on the fluorescent face of the oscillograph cathode ray tube. So accurate is this device that the passing of a sample through the flame of a match will cause a variation of hardness great enough to bring about a rejection. Next is a bending test to make sure the center of the blade will flex in the razor.

Having passed these tests, the coil of steel, now perforated, hardened and tempered, is run through a series of delicate gauges, to again determine that the breadth, thickness and centering are uniform.

The approved steel is again passed through the "laundry," after which it goes to the etching machines, where the trade mark and other distinctive lettering are etched on the metal with acid.

After another examination, the coil is sent to the sharpening machine. Two sets of grinding wheels, one for each edge, first remove the rough stock. Next the honing wheels, cutting at a different angle from the grinders, produce a perfect bevel on each edge.

After being honed, the blades are washed clean and dried with compressed air before passing on to the stroppers of specially tanned leather. Each blade is finished on 280 feet of sharpening surface while passing through this machine.

Inspectors stationed at the ends of the finishing machines submit their blades to tests with microscopes and gauges, finishing the test by cutting hair with the blades.

Samples from the finishers are also sent continually to the laboratory for examination by a photo-electric sharpness comparator. This machine measures the area of the blade edge with a beam of light. As the light traces down the length of the blade, a dot is thrown on a ground glass.

With cross-section paper placed over the glass, a girl traces a graph of the blade's edge. If the graph is straight, or nearly so, the blade is satisfactory. If it is saw-toothed, irregular, something is wrong with the grinding machine. That machine is stopped immediately, and the blades it has finished must be rejected.

The finished blades now go to a room which at first glance you would take to be a library. Girls are studiously pouring over, not books, but stacks of blades. Every blade that leaves the factory is inspected by these girls.

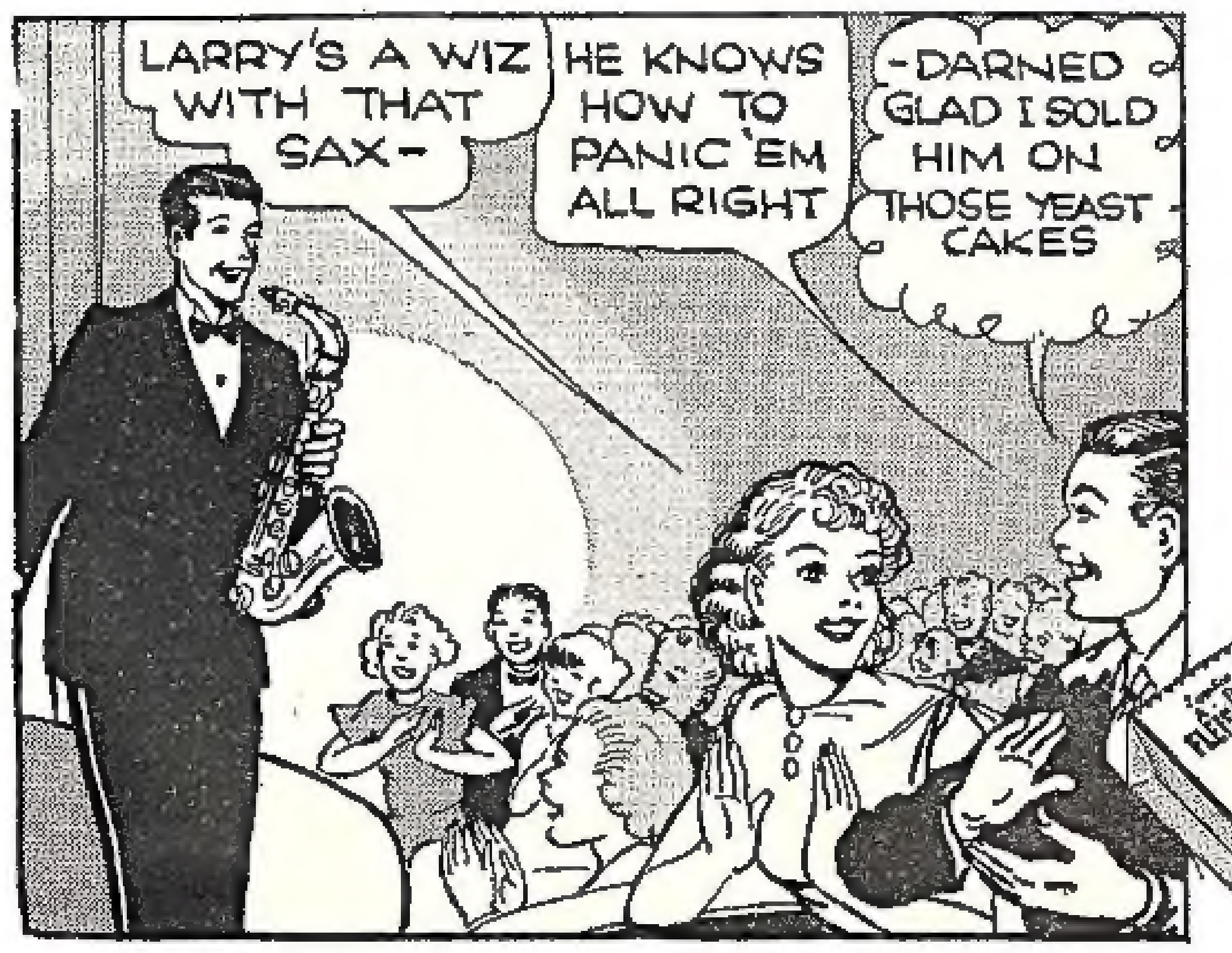
After passing this last barrier the blades are sprayed with a powerful antiseptic solution, after which they are immediately wrapped, sealed in a wax-paper envelope and an outside wrapper.

In an endeavor to improve its product the Gillette Company has several inventors on salary, constantly working on new developments for the razor and blade.

And all so you won't wear whiskers.

NOW LISTEN, LARRY —YOU CAN'T BACK OUT!
NEXT DAY
TAKE IT FROM ME, LARRY-THESE YEAST CAKES ARE SLICK STUFF TO FINISH OFF PIMPLES - JUST YOU START EATING 'EM RIGHT OFF!
GEE CHARLIE - YOU SURE ARE ONE SWELL GUY!
LATER
HEY CHARLIE-TAKE A SQUINT AT MY FACE-THAT FLEISCHMANN'S YEAST WORKED
WELL I TOLD YOU IT WOULD CHASE THOSE BLOSSOMS - DIDN'T I ?

READ HOW LARRY'S PIMPLY FACE ALMOST MADE HIM QUIT THE SHOW
SAY - WHAT'S BITING YOU? YOU'RE NOT SERIOUS ABOUT NOT BEING IN THE SHOW, ARE YOU?
I CERTAINLY AM - WHAT D'YOU FELLOWS TAKE ME FOR? THINK I WANT TO GET UP AND PLAY IN FRONT OF A BUNCH OF PEOPLE WITH THIS PIMPLY FACE? NOT MUCH!
GOSH - WHY DIDN'T I THINK OF IT BEFORE - IF THOSE PIMPLES ARE ALL THAT'S HOLDING OFF LARRY - I KNOW WHAT WILL FIX 'EM!
SNAP


LARRY'S A WIZ WITH THAT SAX-
HE KNOWS HOW TO PANIC 'EM ALL RIGHT
-DARNED GLAD I SOLD HIM ON THOSE YEAST CAKES
FLEISCHMANN'S YEAST

Don't let Adolescent Pimples keep YOU from being a hit

Ugly pimples make any boy or girl want to steer clear of the spotlight. Yet many young people suffer this embarrassment after the start of adolescence—from about 13 to 25, or even longer.

During this period, important glands develop and final growth takes place. This causes disturbances throughout the system. The skin becomes very sensitive. Waste poisons in the blood irritate this sensitive skin. As a result, pimples appear.

Fleischmann's Yeast clears these skin irritants out of the blood. Then, pimples go. Eat 3 cakes *daily*—one before each meal—plain, or in a little water—until skin clears.

—clears the skin

by clearing skin irritants out of the blood

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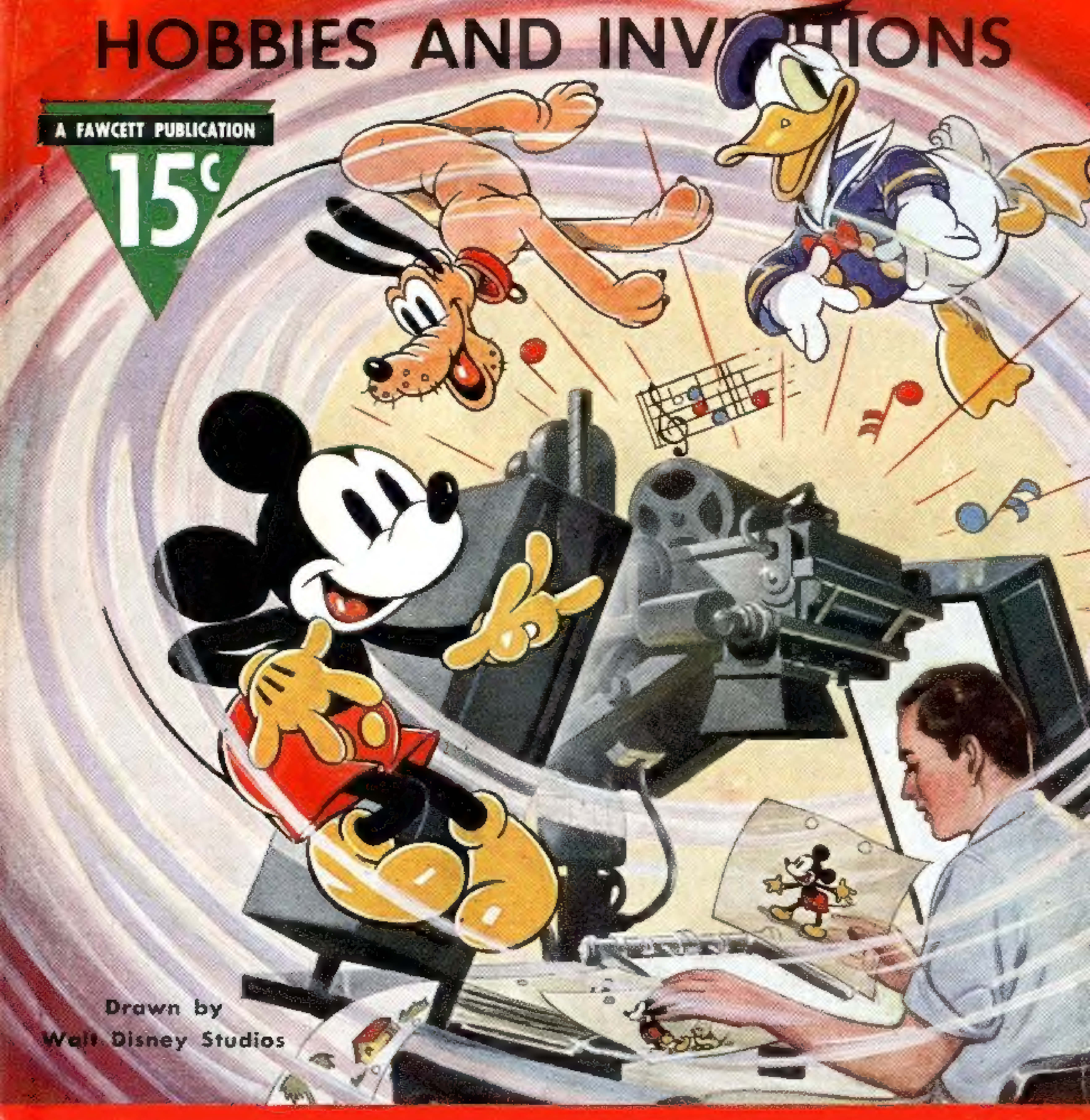
Alt. Cover

JANUARY

MODERN MECHANIX

HOBBIES AND INVENTIONS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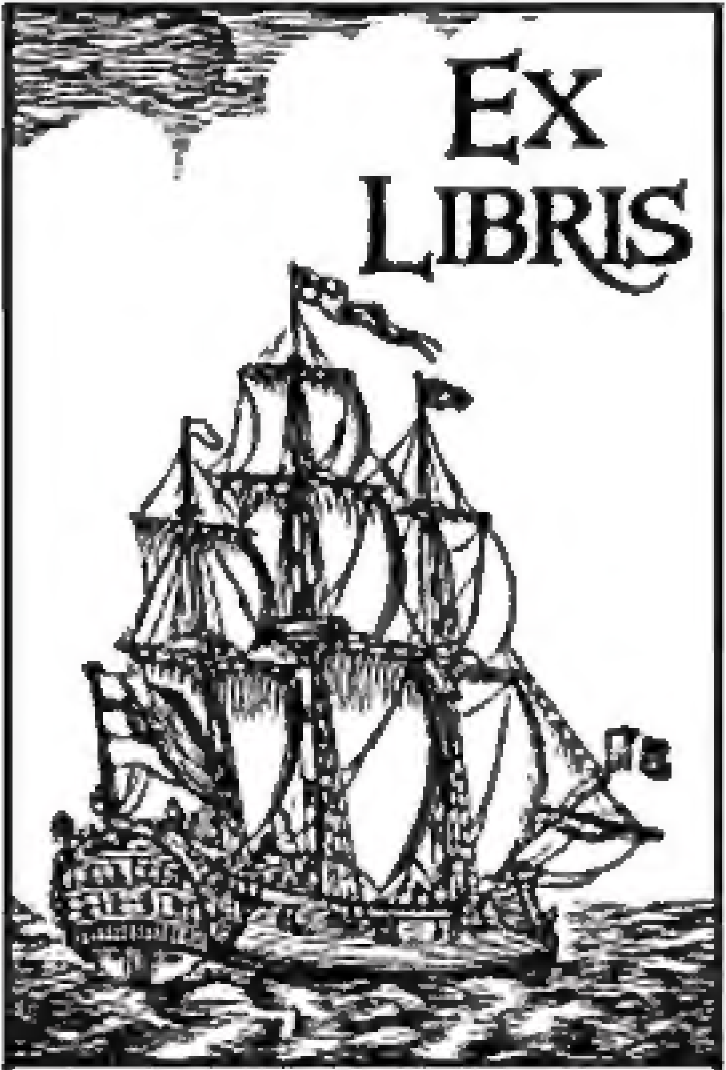
Mickey Mouse Sound Tricks Revealed

GREAT INVENTIONS OF FAMOUS MEN



Anon. Malefactor